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PRACTICAL

OBSERVATIONS

ON

THE DISEASES

OF

THE URINARY ORGANS;

PARTICULARLY THOSE OF

THE BLADDER, PROSTATE GLAND, AND URETHRA.

ILLUSTRATED BY CASES AND ENGRAVINGS.

By JOHN HOWSHIP,

MEMBER OF THE ROYAL COLLEGE OF SURGEONS IN LONDON,
AND OF THE MEDICO-CHIRURGICAL SOCIETY.

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TO

JOHN HEAVISIDE, Esq.

SURGEON EXTRAORDINARY TO THE KING.

F.R.S. F.A.S., &c.

My dear Sir,

When I consider the number as well as the variety of my obligations to you, and particularly when I recollect that to your friendship I am indebted for all those opportunities that have led to the following observations, I consider myself bound in gra-

titude to present to you these First-fruits of my professional experience, however unworthy of your attention they may prove, on examination.

Believe me to remain
Dear Sir,
Your much obliged
and Ever Faithful Servant,
JOHN HOWSHIP.

14. *Mill Street, Hanover Square.*
May 17. 1816.

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INTRODUCTION.

THE particular branch of surgical practice that forms the subject of the following practical observations, is certainly one of the highest importance, whether it is considered with regard to the comfort or the safety of the patient; neither is the humane attention, the professional skill, or the manual dexterity of the Surgeon, more frequently called forth, than on those occasions in which the urinary organs are affected with disease.

The concealed situation of most of the parts concerned, the frequent ambiguity of symptoms, and the great length of time that these complaints in some instances continue, are so many fertile sources of obscurity, and they have powerfully tended to retard the progress of our knowledge in this particular department of pathology.

The advance of chronic disease is frequently insensible, and when after severe illness, the more distressing symptoms are relieved, the patient, weary of confinement and physic, is apt to become careless of himself; perhaps being able to go about, he neglects all rule for years together, until the same complaints which he supposed entirely removed, again recur, and he then most probably consults another surgeon, under the expectation that he may prove more indulgent than the first had been, thus enabling him to recover his health, less at the expence of the comforts and enjoyments of life, than he had before been allowed to do. These circumstances throw peculiar difficulties in the way, the progress of disease is unavoidably lost sight of, and it in fact requires more diligence than many persons are disposed to apply, to follow up the progress and consequences of these complaints with that exactness and accuracy which is necessary, with a view to any purpose which may be connected with the future benefit of mankind.

In the following pages I have endeavoured to bring into one general view, the symptoms and treatment, of most of the diseases of the urinary organs, together with the appearances that have been found on examination of those diseases, in the various stages of their progress.

They are to be considered as forming some part of the result of my own professional experience,

as they are derived almost exclusively from what I have myself seen, attended to, and noted down at the bed-side; and consequently many of the circumstances hereafter noticed, will be found to agree with those already adverted to by others, who have travelled before me in the same path of scientific research.

The plan of confining the following remarks almost exclusively to what has fallen under my own observation may seem objectionable, from its conveying an idea of their affording a very incomplete view of the subject; but I have nevertheless given it the preference, because, however useful comprehensive works may be, they are generally more or less deficient in accuracy, from the admission of statements not sufficiently well-founded, but calculated rather to mislead than to correct the judgment of the practitioner.

For some few of the histories of disease I have been indebted to the kindness of Mr. Heaviside, as well as for the whole of the illustrations, which are selected from among the preparations in his extensive and valuable collection of diseases.

There has been less attention paid to form and arrangement than some perhaps may think right, but my principal and almost only anxiety has been to bring forward a simple detail of facts, the object of which is, to be if possible in some degree useful, in a Profession, the advancement of which

is in every point of view essentially connected with the happiness of mankind; and for those defects or inaccuracies that may have escaped notice, I rely with confidence upon the indulgence of a liberal and enlightened public.

PRACTICAL

OBSERVATIONS

ON THE

DISEASES

OF THE

URINARY ORGANS.

CHAPTER I.

ON THE SYMPTOMS, CAUSES, AND APPEARANCES PRODUCED BY DISEASE IN THE KIDNEY.

SECT. 1.

On the Structure and Functions of the Kidney.

THE structure of the kidney, as regards its secreting apparatus, forms one of the most simple arrangements that can be conceived.

The renal artery on reaching the central part of the kidney throws off its branches in a radiated direction towards the surface of the gland; and these again, are subdivided into innumerable ramifications on entering the cortical substance. Here the arteries take on that peculiarity of form which is the only qualification they apparently possess,

fitting them for the performance of their office in secretion. They form small masses of vessels, easily seen by the microscope, when injected; and these vessels seen in some points of view appear to take a serpentine course, in others they have the appearance of radii, and in others again they are convoluted upon themselves.

But the nature of that power by which a particular set of capillary arteries are rendered capable of selecting and combining certain elementary principles, derived from the general mass of circulating blood, so as to produce a new compound or secretion, which cannot in any case be detected in the blood itself, is one of those points in physiology, in which we are still obliged to confess our want of information.

The art of injection, however, has proved beyond a doubt, that the minute arterial extremities have an established communication with two distinct sets of vessels; one of these being the extreme branches of the renal veins, the other the tubuli uriniferi, or proper excretory ducts of the gland. Air, water, and urine tinged with ink, may be readily driven round from the renal artery into the excretory ducts, as well as into the veins of the kidney, and even wax has occasionally been made to pass in both these directions.*

* Boerhaave. Prælect. Academ. vol. iii.

SECT. 2.

On inflammatory Affection, and increased Secretion of the Kidney.

ALMOST every complaint to which the kidney is subject may be connected, more or less, with inflammatory action, and as the treatment proper for the removal of inflammation must always be taken into account, in the management of those affections in which increased action prevails, it may not be improper to enumerate its symptoms in this place.

Inflammation of the kidney has been defined, "fever; pain in the region of the kidney; frequent desire to void urine, which is either of a pale, or very red colour; vomiting; numbness of the thigh; retraction, and pain in the testicle of the same side *." The pain attending in this complaint, although in some cases very acute, may be generally distinguished from that produced by rheumatic affections of the loins, by its not being materially aggravated by the motions of the trunk of the body. There appears, however, to be no symptom by which we can be enabled with any certainty to decide whether the inflammatory action is idiopathic, or whether it is symptomatic of a disposition to form calculous matter, unless this is indicated either by

* Cullen.

the state of the urine, or proved by the past experience of the patient, as to the complaints to which he may have been subject.

The most curious derangement that occasionally takes place in the actions of the kidney, appears to be that peculiar and astonishing increase in its secreting power, which constitutes diabetes. The pathology of this disease is still very imperfectly understood, but if we may be allowed to estimate the value of a theory by its success when applied to practice, that seems to be the best which attributes the diabetes mellitis to a peculiar derangement in the state of the digestive organs, which operates by favouring the too abundant evolution of those principles which furnish the kidneys with the elements of the saccharine matter, which we know is secreted in most cases of diabetes in large quantity. The particular consideration of this complaint, however, falls more immediately within the province of physic than surgery.

Sect. 3.

On Calculous Affections of the Kidney.

Of the morbid affections of the secreting vessels of the kidney, one of the most common is a disposition to evolve a concrete, or calculous matter. This deviation from the healthy action of the kidney manifests itself by the appearance of the urine, in

which a substance more or less resembling gravel or sand, is usually found.

The particles of calculous matter, however, may be collected together, so as to form one or more larger masses, and these may continue to increase, either in the cavity of the kidney or in that of the bladder, until from their weight or roughness of surface they create irritation; which irritation in its turn becomes the exciting cause of a new train of symptoms, always distressing, and frequently capable of being relieved only by the performance of one of the most serious operations in surgery, that of cutting the stone out of the bladder; but where a calculus has acquired a certain degree of magnitude within the cavity of the kidney, bringing on in this situation all the evils attendant upon irritation, the case becomes most unhappy, for the patient has not then the hope, which even the prospect of an operation might afford.

The appearance of the calculous matter voided with the urine, in what has been called a fit of the gravel, will vary according to the peculiar tendency in the habit. It most commonly presents itself in one of two forms. First, it may have the appearance either of minute crystalline grains or sand, or an impalpable brown powder, and in either case the precipitate is found by analysis to consist of uric acid, either pure or mixed with a very small proportion of the phosphates. Secondly, the matter depo-

sited in the urine may have very much the appearance of a white sand, principally composed of the ammoniaco magnesian phosphate, although frequently containing variable proportions of phosphate of lime. The phosphates, however, are occasionally voided in solution, in which case instead of their being found immediately the urine is passed, they never make their appearance until that fluid has remained at rest for some hours, when a fine pellicle, or crystalline lamellæ, may be observed to form upon the surface.

Calculi formed in the cavities of the kidney are almost always composed of uric acid, and they will sometimes increase in this situation, to a considerable size*; but where from accidental circumstances, such as exercise, bodily exertion, or the like, a small stone has made its escape from the kidney, and has passed down into the bladder, the urine is generally for some time afterward unusually loaded with uric acid, and deposits that substance now in the bladder. When this period however has passed over, the subsequent addition to the calculus consists principally of the phosphates.

In some few instances small kidney calculi, composed of oxalate of lime, have been voided, but such occurrences are rare.

---

* See Calculus, PLATE I. *Fig.* 1.

We see then that the formation of a red sand, or a white crystalline matter, or a consolidation of these substances into a single mass or stone, constitute the appearances most usually met with in the urine, where a disposition to secrete calculous matter exists in the kidney; but I have in one instance found a kidney loaded with a very singular kind of matter. It occurred in the examination of the body of a person who never had complained of any affection of the urinary organs. By mere accident the kidneys were examined, and that upon the right side was perfectly healthy; the left however was much enlarged, and felt as if crammed with a stiff pulpy matter. On removal from the body it was remarkably heavy, and weighed more than a pound and a half. Upon cutting into it, the pelvis and infundibula were found full of a compact earthy substance, in consistence resembling birdlime, of a pale yellowish grey colour*. The secretion of this curious substance had in all probability been going on for a considerable length of time, as the cavities of the kidney were much enlarged from pressure, the result of which had been the removal of most of the solid structure of the gland. The renal artery and vein were readily

* By analysis Mr. Brande found this matter to consist of carbonate of lime, mingled with an extremely tenacious animal matter. He observed that it was the first instance he had ever known of the kidney secreting carbonate of lime.

enough found, but there was no remaining trace whatever of the ureter, although the cellular membrane and peritoneum in which it is commonly situated were dissected with care, a circumstance which afforded a strong argument that the healthy action of the kidney must have ceased long before.

Where a small calculus has formed in the kidney, the most desirable event is its passage by the ureter down into the bladder; particularly if the figure of the stone is such as to admit of its subsequent escape by the urethra. The symptoms that attend this event are generally sufficiently well marked to point out the nature of the complaint, provided the affection is not complicated with disease of any other kind. *

The secretion of calculous matter may be reasonably expected to produce at least some disturbance within the cavities of the kidney, by irritating the tender membranous surfaces. We see that while the urine deposits gravel at the bottom of the vessel, a thick cloud of dense mucous matter most frequently demonstrates the state of excitement in which the mucous cavities of the kidney are placed.

The increased secretion of mucus, in these cases, may be regarded as an effort on the part of the constitution, to defend the surfaces of the membranes from the contact and irritation of the cal-

* See CASE 4.

culous particles; but it may be also considered as a bond of security in another point of view, for the quantity of fluid matter thrown off by this means must materially unload the vascular system of the gland, and keep in check any tendency existing in the parts, to run beyond irritation into inflammatory action.

Sect. 4.

On Irritation and Abscess of the Kidney.

In particular instances of disease, the irritability would appear to be very unequally distributed, and without any more obvious cause, one particular part of the kidney, and that part only, will frequently be found to pass through all the gradations of diseased action, without a possibility of tracing any previously existing cause for irritation in the particular seat of the affection.

I have much more frequently in the examination of bodies, found collections of purulent matter in some one part of the kidney, than those appearances resulting from inflammation of the whole of the gland. In one instance, however, I have known chronic inflammation and abscess of the whole kidney follow from what was at first only a sympathetic affection, alternating with irritability at the neck of the bladder. *

---

* See Case 8.

Here then, we come to inflammation either partial or general of the kidney, an affection which is frequently brought on in consequence of irritation from gravel; in which case the symptoms that attend inflammation from any other cause will be present, and require a treatment regulated according to the same principles.

Should the irritation have been long continued, the increased mucous secretion from the internal parts of the kidney, may by an insensible change take on all the characters of purulent matter, without any part of the secreting surface having ulcerated; at least I have in several cases seen such fluid passed with the urine, and after death found the kidney and ureter loaded with pus, although when the parts were clean washed, the inner membrane lining the pelvis and infundibula was perfectly free from any appearance of ulceration.

Where inflammation of the kidney has proceeded to form abscess, the purulent contents may escape by bursting into the pelvis of the kidney, and flow off by the ureter with the urine, and this of all others is the most desirable mode of getting rid of it. Frequently, however, things take a less favourable turn, and the ulcerative process extends itself in some other direction, in which event the immediate seat of the disease is still relieved from its load, but the obtaining this relief is an effort of nature which very rarely terminates well. The

matter may be evacuated, but the establishing a passage by which it may reach the surface of the body, necessarily involves a diseased state of some of the surrounding parts, by which the patient is at last cut off from the long continued irritation and purulent discharge.

Sect. 5.

On Renal Hæmorrhage.

The consequences of irritation from calculus in the kidney, are not always confined to the above mentioned limits. Either from the figure of the stone, or some other circumstance connected with the excitement of the parts, abrasion of surface may take place, and hæmorrhage arise, so as to prove an additional source of uneasiness, or even alarm; although when it proceeds to a moderate extent only, it has sometimes appeared to operate rather favourably than otherwise, by abating the irritability, and procuring a state of comparative ease and comfort.

Where blood has been evacuated with the urine, the quantity will be generally such as to render the fact sufficiently obvious, for it either forms a thin coagulum spread over the bottom of the vessel, or if the quantity is greater, the coagulum will be in proportion considerable.

When the quantity of blood is only trifling, there may be some hesitation in determining upon its presence. The question may be at once decided by dipping a bit of linen into the urine, which if it contains blood will leave a clear red stain upon the cloth, a circumstance that will not be observed if the urine is free from blood, however high coloured it may be.

The circulation of the blood through the kidney, independent of those causes already adverted to, may occasionally be very much disturbed from accidental circumstances. I have in one instance seen an accidental excitement in the secreting vessels of the kidney very nearly productive of a complete retention of urine, and as the appearances in the urine were of a very singular nature, some of the particulars of the case will be noticed in a future part of these observations. *

Sect. 6.

On Distension of the Kidney, and the Formation of Hydatids.

The healthy organization of the kidney is occasionally, although not very frequently destroyed by the slow operation of other diseases. From the

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* See Case 9.

long continuance of obstruction in any part of the urinary passages, the flow of urine being interrupted, the cavities of the kidney become loaded with the fluid, which accumulates as it is secreted. By this means a degree of pressure is established, which as it increases, induces by degrees a total resolution of the whole of the natural structure of the gland, which is ultimately found converted into an assemblage of large and small cysts, or thin membranous capsules.

The kidney is also now and then subjected to a disease, that I believe commences in the cellular texture, immediately behind the membrane lining the cavities of the gland. Serous fluid is deposited at certain points, and as this fluid accumulates, the pressure from within operates by condensing the cellular structure, so as to form cysts which become detached from the surrounding parts, and subsequent to this period, they sometimes by continuing to grow larger, excite a partial absorption of the mucous membrane lining the cavities of the kidney, and upon this principle hydatids of various dimensions have in certain cases made their escape into the ureter, and have been voided with the urine from the bladder.

The consequences that arise from over distension of the cavities of the kidney when accumulation of urine takes place, will be again adverted to in the consideration of the treatment of these complaints;

but the diseased kidney produced by hydatids, is in a practical point of view less important, inasmuch as the nature of the malady is such as does not admit of relief, by any means with which we are at present acquainted.

CHAPTER II.

ON THE TREATMENT OF DISEASE IN THE KIDNEY.

SECT. 1.

On the Treatment of inflammatory Action in the Kidney.

THE treatment of inflammation of the kidney proceeds upon the same general principles that regulate the cure of other inflammatory affections; bleeding, warm bath, mild purgatives, emollient clysters, together with the free use of mild demulcent liquids; but the use of blisters although they are very excellent applications in most of the local inflammations, are in the present case hazardous and uncertain in their effect, and should scarcely ever be adventured upon, from the risk of absorption of the cantharides, the least particle of which taken into the constitution, would not fail very materially to aggravate the disease.

But notwithstanding that in certain states of constitution the lancet must be considered our principal dependence, it frequently happens that the treatment will require to be modified, accord-

ing to circumstances. Provided the patient has youth and strength upon his side, and the symptoms are urgent, large and repeated bleedings at the arm, together with immersion in the warm bath as often as may appear expedient, are very proper as well as very powerful remedies; but where on the other hand, the patient is not young, and the constitutional powers are in a state which admits of their being much more readily taken down than set up again, common prudence with a very limited share of observation will be sufficient to demonstrate the necessity for caution. Every symptom should be considered with attention, and every means of treatment that can operate by diminishing strength should be so directed, that it may as nearly as possible do what is wanted without doing more.

Upon this principle, the application of leeches, or cupping glasses, will often supersede the use of the lancet; the hip bath, or even fomentations only, will be occasionally preferable to the complete immersion of the body; and the more direct means of abating arterial action will be powerfully assisted by the judicious administration of opiates, particularly where there is reason to suspect calculous irritation about the kidney.

There are some cases of inflammatory affection of the kidney, the management of which will require almost infinite caution; in these instances

the attack usually appears to come on without any sufficiently obvious or satisfactory exciting cause.

It sometimes happens that, towards the turn of life, there shall be an attempt made to produce a new disease in the constitution, or at least one new to the patient who has never experienced it before. When this takes place, should the strength of the constitution be materially deficient, or should the treatment of the apparent symptoms be carelessly conducted, the chances are very unfavourable, from the probability of the disease settling itself upon some vital organ, an event which generally terminates fatally.

I have seen several remarkable instances of the gout making its first appearance in this way. In one, the great toe at first became tender, and somewhat inflamed, but this in a day or two went off upon the sudden accession of paralysis, from which notwithstanding every thing proper was done for his relief, the patient never recovered, although he continued for some few years to drag on a miserable existence. Two other instances of the same description, in which the kidneys were concerned, will be noticed with the cases.

Sect. 2.

On the Treatment of Calculous Affection of the Kidney.

In the treatment of calculous affections, various plans have at different periods been proposed, but the present mode, proceeding upon better principles, and derived more immediately from the very advanced state of chemical science in this country, is certainly more successful in practice than any of the doctrines that were formerly acted upon for the removal of these complaints.

In those cases where an excess of uric acid prevails, it frequently manifests itself by symptoms scarcely falling short of inflammation of the kidney, especially where a calculus has formed, and perhaps is about to make its way down into the bladder. Where, however, a calculus is not produced, the deposit either of a reddish brown sand, or a fine powder of the same colour, in the urine, will sufficiently demonstrate the nature of the action going forward in the kidney.

With a view to relieve this tendency to throw off an excess of uric acid from the constitution, the exhibition of alkalies has been had recourse to, and frequently with success. But the continued use either of the vegetable or mineral alkali, has

been generally found to derange the stomach to so great a degree, that it has been necessary to lay aside the remedy altogether.

Still however some of the properties belonging to alkaline matter, seemed to be required in every remedy for this particular kind of calculous disorder; and while magnesia appeared likely to answer the purpose as well as the alkalies in some points of view, it certainly was in others less objectionable. These considerations led to a series of experiments, which have established for it a very high regard in those calculous affections of the kidney, connected with a deposition of uric acid or red sand.

It appears from practical observation that magnesia, as a remedy, not only corrects those stomach complaints usually connected with the evolution of gravel or stone much better than the alkalies, but that the use of it can be continued for a longer space of time without injury to the digestive organs than those remedies; independent of which, it certainly succeeds much more frequently than the alkalies in relieving the complaint, by the permanent removal of all the symptoms.

So far magnesia merits the high character it has obtained; but, like the alkalies, it requires to be attended to during its exhibition, for when continued to be taken beyond the period in which it proves useful, it is found to operate by re-pro-

ducing the very evil which it had previously removed. In other words, should the administration either of magnesia or the alkalies be persevered in after the uric acid has disappeared, they almost always occasion a copious deposition of the phosphates; these salts being now found in as great abundance in the urine as the uric acid had before been. Neither is the production of the white sand materially less distressing to the patient in the irritation it produces, than the evolution of the red gravel.

When things take this turn, the case requires a considerable degree of attention, in watching the alternate vibrations of the beam, until at last the balance is brought to an exact equilibrium, and the patient's health is restored. If, as above stated, by the too long use of alkaline medicines, the excess of uric acid has given way and a precipitation of the phosphates has taken place, the alkaline remedies must of course be immediately laid aside, and instead of them the muriatic acid may be directed, under the influence of which the secretion of the phosphates will soon be observed to give way, but as the use of this, or either of the other mineral acids are known to favour the reproduction of the red sand, they also must be watched with care, for this effect may in general be prevented easily enough by laying them aside in time.

It does happen however, occasionally, that the mineral acids cannot be so exhibited as to check entirely the deposition of the phosphates, without bringing forward the increased secretion of uric acid; and this circumstance is not the only objection that may occur to their use, for in cases where the inner membrane of the bladder is irritable, they are generally found to increase this disposition, so as to occasion in some instances the most extreme distress.

Under these circumstances a trial of the vegetable acids has been proposed. They have been exhibited, and it has appeared that these remedies also have a strong claim to attention. The citric acid particularly, is ascertained to possess the power of checking the deposition of the phosphates as effectually as the mineral acids, without being so apt to induce the re-appearance of the red gravel.

Most frequently the exhibition of the citric acid, by preventing the excessive evolution of the phosphates in the urine, tends to relieve any irritable disposition that may exist about the neck of the bladder, but where the contrary effect is produced, the inconvenience has been removed by adding a few drops of the tincture of opium to each dose of the acid.

Even the carbonic acid has great influence in preventing the deposition of the phosphates, and

this does not depend on its preventing their secretion, but arises from its having the power of holding these salts in solution in the urine; for in cases where this acid has been exhibited, the phosphates have been still found in excess, although in a state of solution. This fact has been further proved by suspending the exhibition of the carbonic acid for a time, an experiment that has been immediately followed by the precipitation of the white sand, which has again disappeared upon the renewed exhibition of the acid.

The strongest recommendation in favour of this remedy seems to be this, that when the irritable state of the bladder will not admit the exhibition even of the vegetable acids, the carbonic acid will be particularly useful, inasmuch as it does not increase the irritability of the parts, notwithstanding it frequently gives the same relief to the symptoms, which in other cases the mineral acids are capable of affording.

Most of the complaints incident to calculous disorders may be considered to be of a mixed character. They are derived in almost every instance from irritation, connected with which there is generally more or less of increased vascular action.

The treatment of those symptoms that immediately arise from irritation, has generally consisted of the mildest and least stimulating regimen, with a plentiful exhibition of mucilaginous liquids.

The arbutus uva ursi has been very strongly recommended by De Haen in almost every complaint of the urinary organs, it certainly possesses considerable astringent power; but judging from what I have seen of its use, I should doubt whether it possesses any stronger claim to our attention than many other articles of the materia medica. Among the most useful of the mucilaginous liquids may be mentioned linseed tea, barley-water, and the decoctions of many of the farinacea.

The exhibition of saline medicines and opiates in these complaints, will form an important and occasionally an essential part of the treatment; tending as they do to moderate increased action, as well as to allay local irritation. Where the symptoms verge more nearly to direct inflammation, they will require the assistance of those means already mentioned as proper for the removal of inflammatory action.

Sect. 3.

On the Treatment of Irritation and Abscess of the Kidney.

In cases where from long continued irritation, suppuration or abscess of the kidney has taken place, the treatment unfortunately must be rather directed to the relief than the removal of symptoms, for it has

scarcely ever been clearly ascertained that these accidents have eventually done well.

In the progress of such a disease, should matter present itself near the surface of the body, any where in the neighbourhood of the kidney, it will be right to let it out, but this should never be done until the probable bearings of the case are distinctly made known, either to the patient, or to the friends. The very idea of an operation implies relief, and where relief is so ardently desired as it ever is in these complaints, expectation winged with hope naturally flies forward, and can scarcely fail to meet disappointment, unless the truth has been clearly pointed out before-hand.

Such an operation, although there is little probability of its being the means of eventually restoring the health or even saving the life of the patient, certainly affords an additional chance of a favourable issue, by ensuring a safe exit for a collection of matter, which if not evacuated externally, might burst internally, an event which must in most instances very soon destroy.

Sect. 4.

On the Treatment of Renal Hæmorrhage.

Where connected with the formation of matter, calculus has formed in the kidney, it may from the irregularity of its surface, or from circumstances

connected with the irritable state of the soft parts, produce abrasion of surface, or ulceration, extending itself so as to include the coats of some of the small arteries, and in either of these modes it may excite hæmorrhage.

When these accidents occur, the blood passing down by the ureter either forms a coagulum in the bladder, giving a peculiar colour to the urine, or it may principally be evacuated in a fluid state by the urethra with the urine, in which case it subsequently deposits a coagulum at the bottom of the vessel.

The treatment of this kind of hæmorrhage will generally be of little importance. Where it appears that exercise or exertion has produced it, rest and quietness will frequently prove to be all that is necessary for its removal. Where, however, the quantity of blood lost is considerable, and more especially when the hæmorrhage is disposed to continue, it may become an object of importance to determine on some means for preventing its further progress.

Bleeding, either general or local, is rarely adviseable, for it most frequently happens, that the constitution has been already sufficiently reduced by the irritation of the preceding stages of the disease. Among the medicines most appropriate for the cure of these complaints, some of the acids, the vegetable balsams, and the more powerful sedatives may be enumerated.

The mineral acids, in those cases that are known to be connected with a calculous diathesis, will be mostly objectionable, from their tendency to encourage a deposit of red sand in the urine. Under these circumstances many remedies derived from the vegetable kingdom may be exhibited to advantage, particularly the bals. copaibæ, which in most affections of these parts, has been strongly recommended.

But where the loss of blood is considerable, and has already materially reduced the pulse, it will be loss of time to wait the uncertain effect of the above means, and recourse must be had to the more powerful astringent, or sedative remedies. Of the first kind perhaps alumen is the most useful; and of the last, that which I believe to be the best, and most to be depended upon, is the acetate of lead, which may be given with excellent effect, not only in this, but in most of the other varieties of internal hæmorrhage.

Sect. 5.

On the Treatment of Distension of the Kidney.

It has been already observed that the organization of the kidney is occasionally subject to injury from the pressure produced by over distension. The degree of injury arising from this cause will be various, dependent as it must be in every case on the nature

and extent of the obstruction to the free passage of the urine.

I recollect an instance in which a distressing and constant pain in the left kidney, accompanied with the most extreme irritability of stomach, induced a gentleman to apply to his surgeon, who, as he was not exactly satisfied with the account of the symptoms, enquired how he made water, and was told very well. This answer, however, not seeming perfectly clear, his surgeon urged rather positively the introduction of some instrument into the bladder. A small elastic catheter was passed, and a quantity of urine drawn off, the symptoms were immediately removed, and the nature of the case was at once cleared up. There had been an obstruction to the free evacuation of the urine, owing to a stricture in the urethra, which had long prevented the bladder from being able to expel the whole of its contents, and as the accumulation increased, the ureters and kidneys had participated in the inconvenience, thus producing the symptoms in question, while the patient deceived himself, and was near deceiving his surgeon also, from his having been in the habit of passing his urine in small quantities, and at short intervals, for so long a time, that at last he was insensibly led to consider this to be the natural mode of action of the parts.

The most common cause of this affection of the kidney, is the blocking up the passage through the

ureter, by a calculus having been arrested in passing from the kidney down into the bladder. It is extremely curious to observe how large a quantity of fluid, and how complete a change in its internal structure, the kidney will admit under these circumstances, without altogether discontinuing its functions, or entirely laying aside the farther secretion of urine. *

In the advanced stages of calculous affections of the kidney, this state of parts is not unfrequently met with, and must be regarded as being principally concerned in shortening life, by the constant and fatiguing pain, and the excessive irritation incident to this particular affection of kidney.

The only medical assistance perhaps, that can be proposed in this distressing exigency, presents itself in the full exhibition of anodynes and opiates, which will generally do all that can be done for the relief of the patient; but under their most favourable operation, little more can be expected than a temporary alleviation of symptoms, although it is astonishing what the constitutional powers may be occasionally made to effect on the behalf of the patient, when they are properly assisted.

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* See Kidney, PLATE 1. *Fig.* 2.

Case 1.

Inflammatory Affection of the Kidney, preceding the first attack of Gout.

August 12, 1815, I was desired to visit a gentleman about forty years of age, who had been suddenly attacked in the middle of the night with a violent pain in the right kidney, attended with nausea, vomiting, and a frequent desire to pass his water.

The pain was not materially increased by the motions of the body, but extended itself downward in the course of the ureter. He also complained of a sensation of numbness about the fore-part of the thigh, and considerable tenderness in the testicle upon the same side. The pulse was at 100, small, but rather hard. The tongue was scarcely white, but the thirst was considerable.

The urine was high coloured and turbid, and upon standing deposited some calculous matter; but the quantity of the sediment was so small that it was difficult to determine its precise nature.

The manner in which the above statement was made, together with the known fallacy of symptoms suggested the propriety of ascertaining immediately the real bearings of the case. With this view I requested he would allow an instrument to be passed into the bladder, and a silver catheter was ac-

cordingly introduced, without the least difficulty or pain.

By this operation about an ounce of urine was drawn off, and the case was proved to be an affection of kidney alone.

In the way of treatment the saline draught, combined with the tincture of opium was directed to be taken every four hours. Half a dozen leeches also were ordered to be applied to the loins, which were subsequently fomented.

On the following day he was much better in every respect, and this improvement continued progressively for several days, when he was so far recovered as to be able to move in comfort about his chamber. The appetite had returned, so far as to enable him to take light food in small quantities.

At this time, without any obvious cause, sickness and vomiting again came on, although nothing was thrown off but watery insipid fluid; accompanied with tenderness, pain, redness, and swelling about the ball of the great toe, a circumstance which immediately raised a suspicion that the whole of what had passed had been dependent on gout. Upon enquiry it appeared that this disease had been well known in the family, but as he had never been at all subject to it before, he would scarcely believe it could be gout. From appearances, however, there was so little reason to doubt the fact, that he was immediately desired to take a few glasses of wine

daily, with a more generous diet than he had yet ventured upon. A light tonic also was directed, the former draught being still continued every evening, because it agreed well, and because it seemed that the medicine which, in all probability, had assisted in bringing the constitutional disease round to its right point, could not perhaps be changed for a better. The foot was well wrapped up in flannel.

Immediately inflammation came upon the toe, all remaining uneasiness left the loins. The general health and strength, improved. The inflammation upon the toe did not prove very violent, but the tenderness, and in some degree the pain extended itself along the sole of the foot, attended with a disposition to œdema.

In the course of a week, the plan of treatment being continued, the attack upon the foot had pretty well gone by, and it soon afterwards went off altogether, leaving the patient in better health than he had enjoyed for many months before.

Case 2.

Sympathetic Affection of the Kidneys, connected with Gout.

J. S. Esq. a middle aged gentleman, who had some time before visited London for the purpose of undergoing an operation for a fistulous complaint, from which he perfectly recovered, was much in the

habit of taking the Seidlitz powders for the occasional regulation of his bowels.

On November 17, 1815, he had taken one of these acidulated powders, which, however, operated so mildly, that on the following day (the 18th) he had only been moved once, and complained of an uncomfortable load at his stomach. As it was supposed that this was the consequence of bile, he, towards evening, drank freely of warm water, and urged the disposition to sickness, by tickling the fauces with a feather. By this means he was enabled to throw off the contents of his stomach, which had a sour taste, and set the teeth on edge.

He still felt so uncomfortable at the stomach, that he was induced to take another large draught of warm water, and cleared his stomach, as before, vomiting repeatedly and violently.

In the evening I called in by accident, and found him in a very restless and disturbed state. The skin was hot and parched, but the most remarkable circumstance was the extremely suffused and dark appearance of the face. There was a certain degree of irritation about the neck of the bladder, and the urine, which was passed in small quantities, had an oily appearance upon the surface, and deposited a powder resembling rose-pink, at the bottom of the basin.

He said he had no pain or uneasiness in his head, but there was notwithstanding a curious

defect in the memory, which rendered him in conversation almost incapable of finding the principal word in each sentence.

On the 19th he remained much the same, the urine still depositing the pink sediment. Camphorated and composing medicines were directed for him.

Early on the morning of the 20th, as he was evidently not better, although he still felt no pain or uneasiness whatever in his head, it was considered right to see a physician in consultation; the result was that his head was directed to be shaved, eight leeches to be applied to the temples, the head to be subsequently kept cool by the refrigerating lotion. The only symptoms still were a degree of abstraction and difficulty in recollecting the words he wanted, but these symptoms were now so considerable, that nothing he said could be understood, although in general when the word was supplied, he was able to decide at once, whether it was right.

In the course of the day he complained of his left foot, and on examination the ball of the great toe was found red and inflamed; and the whole of the fascia at the sole of the foot was extremely tender, painful, and also somewhat tumid. With a view to keep up the action if possible in the foot, the most stimulating applications were made to the parts; and as the bowels were rather confined, an aperient draught was also directed.

On the morning of the 21st the symptoms re-

mained unabated. On enquiry the servant said that his master had complained of his left foot being sore for at least eight days before; he scarcely however felt it except when getting into bed at night, and as he supposed it might have been owing to a strain it was hardly noticed.

During the forenoon he improved so much that in the course of four hours he entirely regained his power of recollection, and spoke exactly as when in health. He now complained much of the knee, wrist and elbow, on the left side, being tender and painful.

It now appeared that he had in time past been occasionally subject to rheumatism, but had never before had an attack of gout, although it was known to have existed in the family. Camphorated and spirituous applications, with hot fomentations, were kept constantly applied to the foot, but the inflammation remained at a stand.

Towards evening his mind became restless, wandering anxiously upon the state of his affairs. The pulse, which had gradually become hurried, although neither full nor very hard, was now at 120. During the night he was extremely restless. There had been two relaxed motions during the day, but there were also frequent copious discharges of flatus from the stomach.

Upon the 22d things were evidently taking the most unfavourable turn, the heat and pain about the foot remained, but the left shoulder was so ex-

tremely tender that he screamed with agony when it was accidentally touched. In the course of the afternoon the small quantities of wine and spirits which had been given at short intervals, could no longer be swallowed; the pulse sunk, and before the following morning he died.

Case 3.

Deposition of the Phosphates removed by the exhibition of the Muriatic Acid.

George Taylor, aged 50 years, was admitted into the St. George's Infirmary, December 9, 1815, having been for twenty years before subject to the gravel. The most severe attack of this kind occurred in 1803, when he was for near a month confined to his bed, with severe pains in the loins, connected with constant uneasiness, and desire to pass his water; when voided it frequently came away in drops with extreme pain, was turbid, and in small quantities, depositing more or less gravel at the bottom of the vessel. The sandy matter or gravel was at this time of a red colour. Subsequent to this attack the urine occasionally escaped involuntarily, but he was generally able to attend to his business as a taylor, up to the period of his coming into the infirmary.

He now complained of considerable pain in the region of the kidneys, with much general uneasiness

about the bladder. There was constant desire to pass the water, which was voided in small quantities, with sharp cutting pain about the neck of the bladder, great straining, and frequently with bleeding. There was also some degree of retraction of the testicle upon the right side, and a sense of numbness extending down the fore part of the thigh.

On examining the urine, it was not found to be particularly loaded with mucus, but deposited a calculous matter, which, although it contained some few particles of red gravel, was principally formed of the white sand.

He was desired to refrain altogether from the use of fermented liquors, and was ordered ten drops of the muriatic acid, to be taken in water, three times a-day.

Under this plan, he soon found his complaints relieved. The symptoms from irritation, however, had began to decline, some time before any diminution in the quantity of calculous matter formed in the urine was perceptible. In the course of a month he was so much better that he requested to be discharged. The little remaining traces of calculous deposit in the urine could now be only occasionally detected, and he observed he had not been so entirely free from pain and uneasiness, or at any time able to pass his water with so much freedom for many years past, as at present.

Soon after quitting the infirmary, these complaints left him altogether.

Case 4.

Renal Calculus voided with the Urine.

The following case occurred to my notice at Scarborough in the year 1808, and may serve to point out those symptoms most commonly produced by the passage of a renal calculus.

A. B. a middle aged man was suddenly attacked with a violent pain in and about the right side of the loins. The pain continued to increase until it became most distressing. In two days however the complaint subsided, so far as to enable him to return to his business as a shoemaker.

For the space of five months afterward, he was occasionally subject to a return of the same kind of pain. He was often entirely free from it for ten days or a fortnight, when it would again return, and sometimes so severely as to excite violent fever. These attacks usually continued from seven or eight to thirty-six hours at a time. The most severe pain was always of an acute description, shooting downward in the course of the ureter from the kidney towards the bladder, and occasionally extending itself to the external orifice of the urethra.

Latterly the severity of the pain induced a degree of torpor, both in feeling and power of action, pervading the whole right side of the body and

limbs. The attack was repeatedly productive of the most urgent and fatiguing tenesmus, with constant desire to pass his water, although neither his stools nor urine were voided without extreme pain.

During the intervals that occurred, although sufficiently recovered to be capable of looking after his business, he very rarely felt as if in perfect health, generally finding a certain degree of internal obstruction in his own idea, preventing the free passage of the water.

About five months subsequent to his first attack, when extremely ill, he was ordered a pill, containing two grains of opium, at noon; it lulled the pain, and he got sleep. In the evening he took a second pill as before. During the night he slept well, and in the morning he arose refreshed and free from all uneasiness. Judging from his own feelings, he now considered himself quite recovered.

Towards evening however, in making water, he felt something come suddenly into the passage, instantly obstructing the flow of urine. It gave great pain, and brought on the most excessive straining, which continued until at length the cause of the obstruction was shot out from the orifice of the urethra, when the water again flowed as freely as ever. On examining the chamber-vase it proved to be a small rounded calculus of uric acid, about the size of a pea, which in all probability had been during the whole of the period of his ill health making its way through the ureter.

Case 5.

*Ulceration, with Calculi in the Kidneys.**

Catharine Harwood was admitted into the Westminster Hospital, August 7, 1765. She came in reported with stone, and was under Mr. Pyle's care. There was a suppression of urine occasioned as was supposed, by a stone or stones in the bladder; but on examination none were found; while in the hospital she in general passed but little water, yet on introducing the catheter upon one occasion as much as half a pint was found. She remained much in the same state for a fortnight, and died on the 21st of the month.

Examination.

In the abdomen all the viscera appeared sound except the kidneys, and here was the source of all her complaints, as well as the cause of her death.

Both the kidneys were in a soft, and almost putrid state. They were very much enlarged. In the pelvis of the kidney upon the right side, was a triangular knotty stone, one angle of which had

* Extracted from a MS. of the late Mr. Watson's; which together with the disease, is preserved in Mr. Heaviside's museum.

passed through a small ulcerated hole in the pelvis, and appeared externally. The pelvis of the kidney was exceedingly thin and tender round the part where it had given way.

Lodged in the infundibuli of each kidney calculi were found; in the cells of the right were several small stones; in those of the left there was a great deal of sabulous matter, but only one stone that had reached the size of a pea. The ureter of the left kidney had several small calculi in it, for some distance down. These were not larger than small pepper corns.

In the bladder was a small quantity of sabulous matter, adhering loosely to its internal coat. Otherwise the bladder was healthy, being neither inflamed nor contracted.

The opening made by the stone through the pelvis of the kidney, must have allowed the urine to escape into the cavity of the abdomen, and thus have hastened the fatal termination of the disease.

Case 6.

Abscess of the Kidney, breaking into the Abdomen.

In May 1813, I was desired to examine the body of a little boy who had died at the age of seven years. His mother stated that he was born a very healthy child, and was so when sent out to wet nurse. He ran alone early, but before he was

eighteen months old, his urine was observed to be high coloured, and was always voided with straining, and sometimes with pain. These complaints occasionally varied in degree, but gradually increased. He had scarcely reached the age of four years, when he was seized with a very severe paroxysm of distress and pain in making water. The urine was red as blood, and deposited a sandy matter that felt like coarse gravel.

At five years old his complaints of distress, frequency, and straining in making water, were so urgent as to lead to the opinion that there was a stone in the bladder. He was therefore carried to a surgeon, who introduced a sound, and as he was able to feel the stone, considered there was no objection to the performance of the operation for its removal. The mother however thought proper to take another opinion upon the propriety of the operation, which from the disturbed and highly irritable state of the constitution, it was considered, should at least be postponed until the health was improved.

The fits of pain and distress, which usually commenced in or about the loins, passing downwards towards the bladder, still continued to return as frequently and severely as ever, reducing him both in flesh and strength, till at length a fresh attack of excruciating pain and irritation supervened, and this soon excited a considerable degree of fever. He now also complained of great pain and exces-

sive tenderness extending itself over the whole of the abdomen, so that he could scarcely endure the weight of the bed-clothes.

Under the additional pressure of his new complaints, he gave way, sunk rapidly, and within a week expired, to appearance completely worn out by the extreme pain and irritation.

Examination.

The body was exceedingly emaciated, but the abdomen was somewhat tumid. Upon laying open the cavity of the belly a quantity of purulent matter, which had a strong smell of urine, was found loose among the intestines; this appearance seemed to be partly the result of peritoneal inflammation. Both kidneys, but particularly the left, had suffered considerably from inflammation; they were studded upon their external surface with pustular appearances, arising from the purulent matter of small abscesses situated in the cortical substance of the kidney being seen shining through the peritoneal coat of the gland.

Upon the surface of the left kidney an attempt had been made, by throwing out a quantity of coagulable lymph, to establish an adhesion to the intestines, to form a passage for the discharge of the contents of the largest abscess. This attempt having failed, the matter had escaped into the general cavity of the abdomen, and subsequently

from the suppuration extending itself, the urine also, exciting an extensive inflammation of the peritoneum, which soon proved fatal.

The ureters were very much enlarged; through their whole extent they bore the traces of inflammatory action upon their internal surface, and were full of purulent matter.

The bladder was much thickened, and the inner membrane highly vascular, from the long continued irritation having established a degree of permanently increased vascular action, scarcely short of inflammation.

Within the cavity of the bladder there was a calculus of a flattened oval figure. The structure of this calculus was made up of numerous thin alternate strata of uric acid and the phosphates, deposited upon a nucleus of uric acid. Besides the calculus, the bladder contained some little urine, and a pretty large proportion of thick white mucous matter. *

CASE 7.

Abscess within the Kidney, discharging itself behind the Peritoneum.

On the 4th of June 1814, I was requested † to examine the body of a gentleman, who had died at

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* See Bladder and Calculus, PLATE 1. *Fig.* 3, 4.

† By Dr. Hooper.

Islington; between sixty and seventy years of age. The following is an outline of the history. About four months before his death he had been attacked with an hæmorrhagic disease, attended with a vomiting and purging of blood, connected with febrile action, which threw out a number of petechiæ. These complaints were prescribed for, and he was relieved. He then became affected with constant and violent pain in the left side of the loins. The urine was thick, and deposited what appeared to be a purulent matter. His complaints were now treated with bougies, by an eminent surgeon, by whom he was told he had a stricture, although he declared he had never in his life found any difficulty in passing his water.

In the course of about three weeks, his pain moved from his loins downwards towards his hip, and as this took place he found himself easier above. Soon after this change, he observed that he made less water than usual, that his stools were more fluid than they were in ordinary, and that they had moreover the smell of urine. This went on for a week or two, when things appeared to be reversed, for he now made plenty of water again, but with it there sometimes came a fluid fœcal matter by the urethra, and frequently flatus, which passed forth every now and then with an audible and most unpleasant sound. With these complaints

he continued to be harrassed to the day of his death.

Examination.

On laying open the cavity of the abdomen, the peritoneum covering the left internal iliac and psoas muscles was found raised up by a large collection of matter, which had taken place in the cellular structure, between the membrane and the muscles. Purulent matter was also found loose in the abdomen, a circumstance which was explained by lightly pressing the membrane, confining the contents of the abscess, for then more matter was seen to pour out by a small round hole, ulcerated through the peritoneum. By this opening a probe was introduced, and the membrane was then divided upward and downward, to the extent of the abscess.

This abscess had entirely separated the kidney from the muscular parts behind it, quite up to the lower ribs, from thence extending itself downward as far as Poupart's ligament. The quantity of matter found in the abscess was about twenty ounces.

Within the diseased kidney several abscesses were found in the infundibula. One of these towards the lower part of the kidney had burst backward into the cellular membrane connecting it to the muscles, and the matter had subsequently made its way down behind the peritoneum, into the

situation where most of it was found after death, although a part had escaped into the general cavity by the ulcerated opening above mentioned.

The contents of the abscess had discoloured and almost disorganized the muscular surface upon which it lay, giving the cellular membrane an extensive sloughy appearance.

A circumscribed spot of inflammation had taken place between the posterior part of the bladder and the anterior surface of the intestine rectum, the consequence of which had been an adhesion of these two parts together. Within this circle of adhesion a small passage was found, by which the ulcerative process had established a communication between the two cavities.

Case 8.

Abscess of the Kidney. *

In 1794 I was sent for to see a young lady, Mrs. P——e, who had been married about a year. She became subject about five months previous to my seeing her to an irritation at the neck of the bladder. She had a very frequent desire to pass her water, night and day, the urine depositing a great quantity of thick mucus. These complaints she

* The following history, together with the diseased parts, are preserved in the museum of Mr. Heaviside, who was the consulting surgeon in attendance.

imputed to having taken cold during menstruation, which suddenly ceased, and never returned.

The disorder continued for six weeks, in spite of opiates, and other rational means. At this time however it suddenly left her, upon the coming on of a pain in the back, with which she was suddenly attacked. This pain was constant, and was situated in the region of the right kidney. A few days subsequent to the commencement of the pain, a tumor appeared upon the part, and continued gradually to increase, extending forwards towards the region of the liver. This gradual increase of the tumor externally went on for about two months.

In this stage of its progress, I was called upon, and found a large tumor in the region of the liver, very hard, very extensive, and in some parts evidently containing a fluid.

I said this seemed to have been one of those cases I had sometimes seen, wherein the disease had never existed in the part where the first symptoms had appeared. That I conceived she never had any disease in the bladder, but a symptomatic action from an original affection in the right kidney, which perhaps might have suppurated, and during the inflammatory stage, it had probably formed an adhesion to the liver, so as to point through that viscus; that although there was matter, the great hardness all around made it better to wait till it was nearer the surface; being

yet deep seated; and that in whatever viscus it might be, the making an opening into it would afford the only chance, though a small one, of recovery.

In the course of a few weeks the fluid came more forward, and the surgeon who attended her desired me to open it, provided I thought it right so to do. I said that as he requested me to do it I would, though it more properly belonged to him. Accordingly, I carefully dissected down to it, between two of the lower ribs, over the region of the liver, till I came to a white shining tumour, into which I plunged a flat hydrocele trocar. Five pints and a half of very offensive matter were let out. She lived six weeks after the operation, and in order that the bed might be kept clean, without improper confinement of the matter, a hollow canula was retained in the opening, which was corked, and the discharge let out twice a day. The quantity evacuated each time measured four ounces. She gradually became hectic, sunk, and died.

Examination.

The liver was perfectly sound, but was upon its inferior surface united by adhesion to the superior extremity of the right kidney. The urinary bladder also was perfectly healthy. The whole of the disease was confined to the right kidney, which was greatly enlarged, and had within it a very large ab-

scess, into which the opening had been made when the contents were first let out.

From this abscess had been discharged at first five and a half pints, which, with half a pint a day for forty-two days that she lived after, being twenty-six and a half pints, formed a total of thirteen quarts of matter evacuated in the above period of time. *

CASE 9.

Singular Effect of Irritation of the Kidneys from the Application of Blisters.

A. B., aged 29, a private in the 82d regiment of foot, was attacked with an inflammation upon his lungs, in April 1808; for which he took proper medicines, was repeatedly bled, and had several blisters. During the continuance of the inflammation he complained of a difficulty in passing his urine, but as this was at first considered to be merely the common effect of irritation from the application of the blister, it excited no particular attention. In a day or two, however, he said these complaints were worse, although the affection of his chest was better. He felt but little pain in making water, but found great difficulty in getting rid of it, from small pieces of soft matter, resembling jelly, passing into the neck of the bladder, and checking the current

* See Kidney, PLATE 2. *Fig.* 1.

of the urine, until, with considerable effort, they were at last expelled through the urethra. These fragments of coagulated matter were found in the urine, and appeared to arise from a peculiar action in the secreting vessels of the kidneys, in consequence of which a part of the gelatine was separated from the blood, together with the urine. There was every reason to believe that the appearance in question was the consequence of a change in the action of the vessels in the kidneys, for on examination of the urine, it was ascertained that the quantity of gelatine expelled in its coagulated state, formed a very small proportion of the whole quantity contained in the urine, a circumstance that was proved by the urine subsequently depositing a larger coagulum of precisely the same appearance and texture as those passed from the urethra.

The largest of these coagula, was formed in the chamber vase from about a pint and a half of urine, its figure was flattened and circular, of a yellowish tinge, but semi-transparent; its weight was near two ounces. Upon examining it more closely it was in some points mottled, from some few of the red globules having been excreted with the coagulable matter.

No further trace of organization could be discovered when these singular appearances were examined with a magnifying glass.

In the course of a week the affection had subsided spontaneously without having been attended with

any pain or particular uneasiness in the region of the kidneys, or any material irritation about the neck of the bladder. During the attack he passed his water about every four or six hours, the only subject of complaint being the difficulty in getting rid of the small coagula that occasionally interrupted the stream of urine.

CHAPTER III.

ON THE SYMPTOMS, CAUSES, AND APPEARANCES, PRODUCED BY DISEASE IN THE BLADDER.

SECT. 1.

Of the Sympathies of the Urinary Organs.

AN intimate acquaintance with the minute, as well as the general anatomy of the urinary organs, will afford the only clue by which we can expect to find any rational ground, upon which to explain the various symptoms that occur, in many of the diseases of these parts.

With the assistance of anatomy we are able to perceive on the one hand that the nerves distributed to these organs are extremely numerous, although they are small, and that in addition to this there is yet another provision, in the lateral connections which the ganglia of these nerves form with each other; while on the other hand a very general source of the sympathetic feeling of one part for another, arises out of a similarity of structure in the two parts, and very frequently the existence of a continued line of similar organization between

the two sympathetic points, however remote these may be.

This law, or principle of action, may be said to be of almost universal application; it seems to depend principally upon the particular measure of sensibility and irritability originally assigned to each particular series of structure in the animal economy, by which any impression received upon one membrane, is more exactly capable of transmission, or in other words more apt to be translated to some other membrane of similar texture, than to any other series of parts, of which the body is constituted. It exhibits a striking instance of a certain unison of feeling, if the expression is allowed, which may be traced more or less distinctly in most of the operations of nature.

Sect. 2.

Of the Symptoms of Irritable Bladder.

The symptoms that point out an irritable state of the bladder are subject to much variety, dependant upon the nature and intensity of the cause. It is however constantly productive of a sense of uneasiness in the region of the bladder, with increased frequency in making water; it is often attended with an excessive discharge of mucous matter from the inner membrane of the bladder, the anxiety to pass the urine being constant, and fatiguing; and it is

sometimes also connected with the most urgent tenesmus and straining, symptoms that are so much increased at the moment of voiding the last drops of urine, that the turgid vessels upon the membrane lining the neck of the bladder, not unfrequently give way, and blood flows out from the urethra.

This train of symptoms may be produced by a variety of causes, inasmuch as it may be excited, either by the formation of gravel or sand in the urine, or by a stone in the bladder, by disease or disturbance of neighbouring parts, or lastly by disease of the coats of the bladder itself.

Sect. 3.

Of Irritation from Gravel, and the Appearances upon Dissection.

The frequent influence of gravel, in producing an irritable state of the bladder is well ascertained, although some patients remain for many years of their life subject to gravel without having been ever materially inconvenienced by this symptom. But whether the calculous matter, when it produces irritation, operates upon mechanical principles, derived from the figure of the crystals, and the contact of these with the irritable surface of the inner membrane of the bladder, or whether it so changes the properties of the urine, as to excite irritation through the medium of the fluid contents of the cavity, the

present state of our knowledge does not enable us satisfactorily to determine.

Neither is the influence of the various remedies employed more uniform in relieving, than is that of gravel in producing, an irritable state of the bladder; for the same means which in one case shall appear to relieve the irritation by preventing the formation of gravel, shall in another equally prevent this deposit taking place in the urine, while it increases notwithstanding, the distress of the patient, by aggravating the irritation.

Where this disorder is produced by calculous matter in the urine, it will, in general, be sufficiently evident, upon observing the appearances of that fluid, independant of which the uneasiness or pain in the loins, the deranged state of the digestive organs, and the other symptoms formerly noticed as connected with affections of the kidneys, will at once clear up the nature of the complaint.

The appearances met with upon dissection in cases where the complaints have been connected with the formation of gravel, and especially in those where the appearance of calculous matter in the urine has taken the lead of all the other symptoms, afford a very interesting demonstration of the extent to which the effects of irritation may be occasionally carried in the living body.

In most instances the change is confined to the most simple effect of irritation, an increased vascu-

larity, and an increased secretion from the inner membrane of the bladder; but the mischief frequently goes further than this, and from the mucous membrane not having been able to defend itself with equal effect at all points, the minute crystals of calculous matter, partially involved in the secreted mucus, have come into contact with the inner membrane, exciting an excessive inflammatory action, with effusion of coagulable lymph. By this means the particles of gravel, although they are in some degree removed from the surface of the inflamed membrane by the interposed stratum of lymph, become permanently fixed in their situation, by the coagulation of the effused fluid.

It is this process that gives rise to certain appearances occasionally found in diseased bladder, much resembling partial slough, attached to the surface of the inner membrane, but upon a closer examination they are obviously patches of effused lymph, covered with rough particles of calculous matter, firmly adherent to them.

Here then we may see the effect of the successive efforts of the constitutional powers to prevent the continued application of an irritating matter to the membrane lining the bladder. First, the natural mucus is thrown off in greater abundance than before; but should this not answer the purpose, the cause still produces the effect, for as the irritation increases, the consistence, as well as quantity of

mucous matter increases with it, as if with a view to disengage or prevent the particles of gravel from reaching the membrane. Where however this expedient fails, that which began with irritation going on to violent inflammation, lymph is effused, which opposes in general an effectual barrier to any farther injury; but where the disposition, or power, in the constitution to throw out coagulable lymph is weak, this last effort turns out no more successful than those that had preceded it, and the irritation continuing still to increase, goes on eventually to the establishment of fatal disease in the coats of the bladder.

Where the excitement has prevailed at particular points only, producing a free effusion of lymph, capable of answering the intention held in view, the appearances may be confined to a number of circumscribed patches of coagulable lymph, each surrounded by an inflamed circle, and covered upon the surface with adherent calculous matter; but where the same effort is made in a constitution possessing more irritability, with less strength, the irritation still continuing to operate, gives rise to circumscribed spots, at which the diseased coats of the bladder eventually throw up a weak irritable vascular fungus, projecting into the cavity, much disposed to bleed from the slightest cause, and possessing, in this respect as well as others, the characters belong-

ing to cancer, while the intermediate parts of the bladder are still found to remain undiseased.

In those cases in which the irritation has been extreme, and of a more extended operation, the diseased appearances are more widely diffused. At some points the calculous matter may be found adherent by the copious effusion of coagulable lymph, at which points the structure of the bladder will retain its natural texture, but in other parts where subsequently the same security was wanted, when not at hand, the whole of the coats of the bladder have in consequence fallen into a state of loose fungous disease, extending its ravages far and wide, until the unhappy sufferer, worn out by pain, irritation, and hæmorrhage, has been at length relieved by the hand of death. *

The disease just described seems to approach the nearest to cancer, of any to which the bladder is subject, it has the same occasional and peculiar lancinating pains, and the same terrible disposition to hæmorrhage, with all the fatality that can attach to a cancerous affection.

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* See Case 10.

Sect. 4.

On Irritation from Stone in the Bladder.

An irritable state of the bladder may depend on the presence of a stone within its cavity. Irritation from this cause is generally productive of great distress in taking exercise, and the motion of riding on horseback, or in a carriage, is almost intolerable; and although, while at rest, the patient may enjoy a state of comparative ease, whenever he voids his urine it is at the risk of the water every instant stopping suddenly upon him, for the current of the fluid brings the calculus forward, so as to make it press against the neck of the bladder, a circumstance that never fails to excite a spasmodic action in the bladder, increasing tenfold the severity of his distress.

Where this complaint occurs in a constitution naturally weak and irritable, or where, from the long continuance of the disease the habit is brought into a state of sympathy with the local affection, the consequences that are induced by the irritation of stone are truly formidable. The urgency to pass the water is constant and irresistible, and in the violent straining, the contents of the bowels are frequently expelled. The pulse is quickened, the stomach impaired, and as the complaints increase, the digestive powers at last totally fail.

The skin becomes parched, there is thirst and watchfulness, hectic fever with delirium follows, and the patient at length sinks exhausted by pain and irritation.

The irritation arising from stone in the bladder is frequently productive of the most extreme torment, and from the contact of the stone with the surface of the inflamed membrane lining the neck of the bladder, it is not uncommon for the vessels to give way, in which event the urine is more or less tinged with blood. This kind of bleeding however, rarely proceeds to such an extent as to deposit a coagulum at the bottom of the vessel in which the urine is received, although this has sometimes happened. In one instance indeed, I have known the bladder completely filled with blood from the rupture of a vessel into its cavity. The patient was an old gentleman, one of the East India directors, who had been many years subject to nephritic complaints. He was attacked with what was supposed at first a retention of urine, and a catheter was repeatedly introduced, but it was suspected it had not passed into the bladder, as no water flowed, although there was a manifest tumor in the situation of the bladder. A surgeon was therefore sent for from London*, who upon feeling the tumor said he thought it was blood, and upon

* Mr. Heaviside.

introducing the catheter, he was confirmed in his opinion. The patient died the following day, and on examination the cavity of the bladder was found entirely filled with a very large coagulum of blood, which had evidently flowed in from some part of the diseased surface of the inner membrane; for upon examining the kidneys, the one was much wasted and extremely small, the other much enlarged, and from previous obstruction converted into cysts by over distension, but neither in the kidneys or ureters was there the least trace of effused blood to be discovered.

The urine is in some instances tolerably clear, but more frequently the quantity of mucous matter thrown off from the inner membrane of the bladder is considerably increased, becoming also much more dense, and consistent than natural; the quantity when the symptoms are urgent, frequently exceeds that of the urine in which it is suspended.

The symptoms produced by the irritation of a stone in the bladder, are in some measure regulated by the particular situation occupied by the calculus. Where the stone lies in contact with the neck of the bladder, it excites a sense of heat and itching sometimes almost intolerable, about the external orifice of the urethra; but where, from the coats of the bladder being naturally disposed to relaxation, or when, from its being distended with urine, the calculus is to a certain degree supported in a

mediate situation, without being pressed against the sides of the cavity, the uneasiness experienced is of a much milder description; where however, from circumstances the calculus has reposed itself at the fundus of the bladder, the peculiarity of its situation has given rise to a very peculiar turn in the symptoms, for they have been all referred to the intestine. In one case of this kind particularly there was no suspicion of stone, as there had been no symptoms to lead to such a suspicion, but there was for years so much irritation and distress about the rectum, that no doubt whatever was entertained by the surgeons in attendance, of there being disease and ulceration high up in the gut, although nothing of this could be felt by the finger. Upon the death of the patient, a large stone was found lying at the fundus of the bladder, but the structure of the intestine was perfectly natural.

The inconstancy of the symptoms produced by gravel in the urinary passages has been already noticed, and the same observation is applicable to those symptoms of irritation that usually indicate the existence of a stone in the bladder.

In some cases a very large stone has remained for many years without having excited any material inconvenience; and I have myself once found at least a dozen calculi, some of them as large as a chesnut, in the bladder, in examining the body of

a man who never in his life had suffered from any of the symptoms of stone, and the evidently quiet state, and pale complexion of the mucous membrane when the bladder was removed afforded a strong confirmation of the fact, as it demonstrably proved that there was not the least degree of excitement or irritation upon the bladder at the time of the patient's death.

Sect. 5.

Of Irritation from Sympathy with surrounding Parts.

Another occasional cause of irritation in the bladder, is the sympathetic connection existing between this viscus and the surrounding parts.

Any irritation or other affection about the uterus or rectum, will give rise to uneasy sensations in the urinary bladder; and according to the nature or continued operation of the cause, the sympathetic irritation will be either a transient affection or a more tedious source of distress.

The irritation produced by worms in the intestines, when they are situated low down in the rectum, will excite a degree of tenesmus, connecting itself with frequency and uneasiness in passing the water; and I have in repeated instances had the same thing occur temporarily, from the irritation incident to my having removed hæmorrhoidal excrescences by ligature.

In one instance I had an opportunity of seeing a gentleman who had been long distressed by the apprehension that he had a stone in the bladder. The symptoms were so like those of stone, that several of the most eminent surgeons in London, whom he had consulted, had sounded him, but in vain, none of them could find a stone, although from what he suffered on the passing the sound, it was sufficiently evident that his bladder was in a very irritable state. The surgeon whom he had last consulted, although not able to feel a stone, thought it might not be amiss to direct something to clear the bowels, and with that view some calomel was ordered.

Upon the operation of the medicine, all the symptoms were immediately relieved, a circumstance that so much surprised the patient, that it immediately struck him there must be something peculiar in the nature of the motion he had passed, when upon examining the contents of the night chair, as many as eleven living insects were found to have been voided with the stool. They were all obviously of one and the same species, the length was about three-eighths of an inch, and with the assistance of a magnifying glass, the head, thorax, with the legs, and an elongated abdomen were very distinctly seen.

A contracted state of the rectum, and especially that kind of contraction produced by a disposition

to scirrhus, always excites an irritable state of the bladder, sometimes proceeding to the most distressing extent, an instance of which, with the appearances on dissection, will be noticed among the cases.*

Where the uterus has become cancerous, a sympathy with the early stages of the complaint generally excites an irritation in the bladder, and as the disease makes progress towards ulceration, the excitement at the neck of the bladder increases, and not uncommonly the ulcerating, and sloughing processes extend through the parietes of the vagina backward to the rectum, and forward into the bladder, until, by a complication of misery difficult to describe, the unhappy sufferer is quickly drained down to exhaustion and death.

An irritable state of the bladder is not unfrequently brought on in consequence of the use of injections for the cure of gonorrhæa, in which case it is generally connected, more or less remotely, with the production of stricture in the urethra; and these circumstances, which I have very distinctly traced in many instances, ought to be regarded as the most unanswerable proofs of the impropriety of having recourse to local applications of an astringent nature, in gonorrhæa. In several cases which will be detailed hereafter, the irritation

* See Case II.

produced by this means was of the most distressing severity, neither had the uneasiness or frequency in passing the water entirely subsided many years afterward.

The mucous membrane of the urethra is a continuous surface with that which internally forms the lining of the bladder, and externally is spread over the glans penis; any increased action therefore, existing upon any one part of this continuous surface may with ease be transferred to another, and if checked prematurely, will shift its situation and take up new ground, where perhaps it may become much less manageable than it could have proved, had it been left entirely to itself.

It is upon this principle that the irritation from gonorrhæa is so liable to be translated to some other part when treated improperly, generally passing backward to the cavity of the bladder, and creating a much more tedious and infinitely more serious complaint, than that which was the original object of treatment.

SECT. 6.

Of Irritation from Disease in the Coats of the Bladder.

IRRITATION in the bladder may also be produced by a diseased state of its coats, but in general, though not always, the disease may be traced back

to a connection, more or less remote, with one or other of the complaints already enumerated, so that it can be very rarely said that the bladder becomes diseased in its structure, unless long continued irritation has previously operated as a cause.

Where however irritation of the bladder comes on, and proceeds progressively from bad to worse, without having any obvious connection with other complaints, or under circumstances in which it evidently stands alone, there will be reason to believe the disease seated in the coats of the bladder, and indeed this will now and then turn out to be the case, although there may be concomitant pains, or sympathetic affections elsewhere.

That the coats of the bladder, under certain circumstances, may take on diseased action very much resembling cancer, I have endeavoured to demonstrate, but I have never yet seen an affection of this nature commencing in the bladder, where it was not the evident consequence of former irritation.

The thickened state of the bladder, in which the cavity is considerably diminished, and the coats in the same proportion thicker and firmer than natural, as it is usually found in connection with obstruction in the passage of the urethra, I never can regard as implying a disposition to scirrhus or cancer,

although some authors* appear to have considered it in this point of view.

The only affections I have yet seen, in which the urinary bladder could be fairly said to have spontaneously taken on disease, were in cases of fungus hæmatodes, a disease which has been but rarely known to affect this viscus; I have only examined two instances of it myself, and only know of one example of the same disease having yet fallen under the notice of others.

Sect. 7.

On the Uncertainty of the Symptoms of Stone.

The symptoms of stone in the bladder are extremely various, and they are so inconstant, that it has been in various instances ascertained that stones of considerable size may be formed in the bladder and there remain probably for years, without producing symptoms; most frequently however, the existence of a calculus in the bladder is indicated by a certain train of symptoms, that with proper attention on the part of the surgeon, will generally clear up the true nature of the case.

The symptoms most commonly produced by stone are a constant sense of uneasiness and weight in the region of the bladder, frequent desire to pass

* Johnston.

the urine, with great pain and straining in the act of voiding it, sometimes connected with urgent desire to evacuate the contents of the rectum. In making water, the stream of urine is liable to sudden stoppage, before the bladder is emptied, a circumstance that arises from the stone being brought into close contact with the irritable membrane lining the neck of the bladder, and is always productive of extreme pain.

The urine voided is generally more or less turbid, from the large quantity of viscid tenacious mucous matter that usually remains suspended, or else subsides to the bottom of the water. The urine is also frequently tinged with blood, and this, as well as the other symptoms, are especially aggravated by taking exercise.

The above symptoms occasionally connect themselves with pains settling in the loins, and passing thence in the direction of the ureters, arising from the irritation spreading through the ureters to the kidneys, and there exciting an increased mucous secretion, which commonly goes on to the subsequent establishment of purulent action upon the mucous surfaces of the cavities of these glands.

In the course of time, the symptoms arising from the irritation of the bladder, increase to that degree, as to afford the patient scarcely any remission of his distress and pain. The desire and straining to evacuate the contents of the bladder

and rectum are almost unceasing, and frequently altogether irresistible. Sabulous and mucous matter, with particles of stone are occasionally voided with the urine, and from the increasing severity of irritation, the urine acquires a highly offensive, alkalescent, or putrid odour. The constitution at length sympathises with the local irritation, and the constant thirst, heat, declension of strength, and loss of appetite all assist in hurrying on the disease to a fatal termination.

There are few points more difficult in practical surgery, than the deciding positively upon the existence of a stone in the bladder, unless the calculus has been distinctly felt by an instrument introduced into the bladder for that purpose. All the symptoms of stone are more or less equivocal, but some of them are exceedingly so. The symptoms that depend merely upon an irritable state of the bladder may arise from any of the causes already pointed out as occasionally producing it; and as to the apparently less doubtful circumstance of a full stream of urine being suddenly arrested, even this has been known to arise from a soft tumor springing by a narrow base from the inner surface of the bladder, where, from its situation, it was capable of being occasionally brought by the current of the fluid, into the narrower space at the neck of the bladder, and when this happened, it operated by suddenly stopping the flow

of urine, and, it is remarkable that in this case, precisely as in stone, the obstruction might generally be made to recede by change of position.

This same symptom I have known produced in one instance, by a very curious and very uncommon affection of the inner membrane of the bladder, in consequence of which that membrane had formed a transverse valvular fold across the neck of the bladder, opposite to the orifice of the urethra. This complaint, as it increased created frequent difficulty in passing the water, and the patient at last died of retention of urine. *

One of the least fallible signs of stone in the bladder, is the extreme increase of pain and irritation at the neck of the bladder that occurs in the act of expelling the last drops of urine, although I have myself found this symptom constantly present in an irritation which proved eventually to have existed quite independent of stone.

The symptom of all others least liable to deceive, appears to be a peculiar effect of the irritation; it is the distressing sense of burning heat, and intolerable itching, that is felt either in or about the external orifice of the urethra; but even this symptom, which may be considered the most certain of any, will occur only when the stone is press-

* The preparation of the disease is preserved in Mr. Heaviside's Museum. See Bladder, PLATE 2. *Fig.* 3.

ing against the neck of the bladder; and in cases where there is no stone at all, the same sensation will be excited, if there is ulceration at the neck of the bladder.

It has been already observed that the symptoms produced by a calculus, are, to a certain degree, regulated by the particular situation of the stone; and that when immediately applied to the neck of the bladder, it usually produces the least doubtful symptoms, that where it occupies a middle situation, the inconveniences resulting from it are generally less distressing, and that in those few cases in which it has been known to have remained at the fundus of the bladder, it has produced extreme irritation and distress in the intestine rectum, and there only.

Affections of the prostate gland are occasionally productive of symptoms, which, unless attention is paid to the case, may be unjustly attributed to a stone in the bladder; but the symptoms arising from affections of the prostate gland, are less subject to aggravation upon taking exercise, than those produced by stone; and where the prostate gland is enlarged, the fact can be readily ascertained in an examination by the rectum; independent of which, the distressing symptoms arising from stone are generally found to take place in paroxysms, compared with which the uneasiness consequent to enlargement of the prostate gland,

is less subject to variation, and usually much less severe.

Sect. 8.

On the Operation of Sounding.

It is upon the whole, very evident then, that symptoms alone, however clear or conclusive they may seem to be, can never warrant a positive opinion as to there being a stone in the bladder. Our dependance requires a better foundation, and we must not rest satisfied with symptoms where we may obtain the evidence of our senses. The operation of introducing a sound into the bladder, may enable the surgeon to feel the stone distinctly, and very often it may be so struck as to be audible to the byestanders; upon this operation alone can we rely for a satisfactory proof of there being a stone in the bladder, and without having ascertained the certainty of the fact by having felt the stone with an instrument, we can never recommend, much less proceed to perform, the operation for lithotomy.

Sometimes however, notwithstanding there is a stone in the bladder, it shall not be possible to ascertain it, by bringing a metallic instrument or sound into contact with it, whether the examination has been made in the erect, or in the horizontal posture. Under these circumstances the

calculus may frequently be detected by passing in an elastic gum-catheter without a stilet.

This instrument would appear to be fitted to convey a more delicate impression than can be received by an instrument of metal, but whether so or not, it has often succeeded in demonstrating the existence of a calculus, when it could not be ascertained by the introduction of the metallic sound.

The elastic gum-catheter has another advantage. It occasionally happens that a person who has long suffered under the fatigue of perpetual pain and irritation, and perhaps has had repeated and unsuccessful attempts made to find the stone by sounding, is so struck with the very idea of the torment he expects again to go through by a repetition of the experiment, that he cannot possibly bring his mind to submit to the proposed trial, whereas if his feelings are not alarmed, if he is merely requested to allow the state of the urethra to be examined by the introduction of a hollow bougie into the bladder, he suffers nothing in apprehension, and scarcely any thing in reality.

In some instances where there has been disease connected with stricture in the urethra, if an instrument cannot be passed immediately into the bladder, so as to feel the stone, the canal must of course be first dilated; but suppose the passage will admit the sound, even this is not enough; the instrument must be left, to a certain degree, at liberty when in

the bladder, and must not be tightly embraced by the contracted part of the urethra, for if it is, every attempt to move it about to any effect when in the bladder, will be either greatly embarrassed, or altogether prevented.

Sect. 9.

On the Disappearance of the Symptoms of Stone, the Formation of Sacculi in the Bladder, and the Principle upon which Alkalies operate on the living System.

The symptoms of stone, after having long continued to harrass and distress the patient, have in some instances become permanently relieved, or have entirely disappeared; and this very desirable change having for the most part taken place during the exhibition of medicines * professing to have the power of dissolving stone in the bladder, there was for some time no direct evidence that the remedies in question did not possess the properties supposed to belong to them; and they were consequently long believed to have the power of actually dissolving a calculus in the bladder; indeed the instances of their efficacy in relieving all the painful symptoms, occurred so frequently, that it was impossible to refuse them a certain degree of regard.

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* Particularly Mr. Stevens's Solvent.

The remedies thus proposed have been all of an alkaline nature, and have all had an alkaline matter for their base, and it is most true that by the exhibition of this class of medicines, the symptoms arising from stone in the bladder are very generally alleviated, and not unfrequently removed; and they may often be given to such an extent that the urine becomes very manifestly alkaline, and is capable of exerting a solvent power upon these concretions. But on the other hand, it rarely happens that their administration can be continued to this extent, for any considerable length of time, from the disturbance they produce in the state of the digestive organs, and sometimes also in the urinary passages.

Considered therefore as solvents, the alkalies are now but rarely used, and they are employed merely to alleviate symptoms or to prevent the increase of the concretion, purposes to which they are supposed to be principally adapted by preventing the generation of uric acid, or at least the separation of it by the kidneys, in consequence of which the urine is rendered less irritating.

But the influence these remedies are capable of exerting in relieving the symptoms of stone in the bladder extends, I believe, far beyond the mere prevention of the evolution of uric acid in the kidneys. There is sufficient evidence that they possess a very remarkable power in diminishing irritability of the bladder, and allaying excitement of that viscus, even

where it has proceeded to the extent of inflammation. There is another very curious circumstance, that has often been observed under the use of alkaline medicines, a circumstance which, according to my mode of explaining it, is directly attributable to the effect they produce upon the bladder,—I mean that particular state of bladder in which a sac, or cyst, is formed.

Examinations after death, in cases where a stone has been long known to have existed, and where by the exhibition of the alkalies the symptoms have entirely disappeared, have shewn that the calculus has remained entire, but the circumstances under which it is placed have been altered, instead of its lying, as at first, loose in the bladder, it is found confined in a little recess, and is prevented from doing further mischief; in consequence of which change, instead of the bladder being, as dissection teaches us every irritable bladder must be, contracted, thickened, and its inner membrane highly vascular, it is found larger than common, relaxed, soft and pulpy in texture, and not unfrequently even gangrenous upon its internal surface; not that gangrene which supervenes upon excessive action and excitement, but a chronic change evidently arising from extreme debility in the vital powers of the part, and totally independent of any appearances of preceding increased action, such as effused lymph, or extensive ulceration upon the inner membrane.

These are very curious facts, and they appear to me not to have met with the attention they deserve.

It has been stated already, that an alkaline matter received into the circulation of the blood, has the power of preventing the separation of an excess of the opposite, or acid principle, by the kidneys. Here then, we have unquestionably an instance, in the living system, of an operation regulated entirely by the known laws of chemical affinity; and I believe that in the relief afforded by the use of alkalies in stone, the agency of the same laws may be clearly traced much further.

The genius, and researches, of one of the most distinguished physiologists of the present or perhaps of any age *, led him to this bold conclusion, that the blood, although a fluid, seeing that it undoubtedly contains the elements of all living matter, is in itself possessed of a living principle, that its spontaneous coagulation should be considered as a proof of its possessing a vital power, and consequently, that blood recently coagulated may be regarded as still alive. Now it appears to me, that agreeable to these principles, the gelatin or fibrin of the recent coagulum of blood may be considered as very nearly parallel to the muscular fibre, or gelatin that is already deposited, or laid down in the various structures of the body, and that the same measure of

* Mr. John Hunter.

vitality is possessed by both, if we make some allowance for its being destitute in the one instance of the appendages it possesses in the other, of blood vessels, nerves, &c.; and consequently, such experiments as tend to illustrate the effect of chemical agencies upon the fibrin of the blood out of the body, will also tend to explain the principle of action of the same substances, as they operate upon the muscular fibre of the constitution.

Now it has been clearly demonstrated by experiment, that all the acids, but especially those derived from the mineral kingdom, have the power of promoting and confirming the coagulation and contraction of the fibrin of the blood, while the alkalies on the contrary, tend to weaken or prevent the act of coagulation; indeed, in their concentrated state they are capable of dissolving the fibrin, subsequent to its having assumed the solid form; and the power which pure or caustic alkali exerts, when applied to the living body, producing a rapid decomposition by disturbing the arrangement of its elements, affords a strong proof that all living matter is liable to be affected even to disorganization by the influence of the more powerful of the chemical affinities.

Upon these grounds it appears to me, that notwithstanding much of the good resulting from the exhibition of alkalies in the irritation of stone may depend on their checking the excessive separation of uric acid by the kidneys, they principally operate

through the medium of the urine, by slowly and gradually abstracting from the inner surface of the urinary bladder a certain proportion of its excitability, diminishing upon this principle, not only the disposition, but the power also, for contraction and excitement; for the contraction of the muscular coat, and the inflammation of the inner membrane, being both dependent upon the same state of high tone in the parts, go hand in hand, are aggravated by the same causes, and are capable of being relieved by the same means.

It is sufficiently evident that where the exhibition of remedies operating upon this principle is continued for any length of time, the extent of their influence upon the coats of the bladder will go on progressively increasing, and the power of contraction in the muscular coat which was at first only moderated, will in time become weakened, and what will naturally be the result of this change?—We know that as the operation of the remedy takes place through the medium of the urine, all parts of the surface of the cavity must be equally acted upon, and whether the muscular coat of the bladder happens to possess every where exactly the same degree of strength or not, still the influence of the alkaline principle is sure to deprive every part of the cavity of an equal measure of its irritability and power of contraction, and consequently should any particular point have been rather deficient in strength,

it is by this means obviously set upon a much more unequal footing with the other parts of the general cavity than it was before, and therefore it gradually gives way in the act of expelling the urine, so as eventually to form a pouch, or sac; for let the thickness instead of the strength of the bladder be the question, and while the general thickness be 3-8ths of an inch, a single point be 2-8ths only, and let 1-8th be removed equally from every part; it is evident that while the thicker parts are reduced to 2-8ths of an inch, the deficient point will now be 1-8th only, or one half, instead of two-thirds the thickness or strength of the remaining parts of the bladder.

The exhibition of the alkalies, however, produce, in some instances, so much derangement of the stomach as to render it impracticable to continue them, and in most cases they prove so disgusting, that if the patient has been able to go on with them until the symptoms give way, they are then very soon laid aside; and should the calculus in the mean time fortunately have found its way into a recess or pouch, the happiest effects frequently follow. The state of the stomach very effectually induces the patient to adopt such a regimen as is best calculated to enable the constitution to recover its wonted vigour, and by the same means the tone of the muscular coat of the bladder improves; and the first effect of this improvement is a degree of contraction ex-

cited round the calculus, in the cyst; and as the muscular fibres naturally contract most, where the resistance is least, the orifice becomes the smallest part of the sac, and this circumstance explains why a calculus once encysted rarely becomes again troublesome to the patient.

Sect. 10.

On a Paralytic Affection of the Bladder.

There are, however, certain states of constitution, connected with deficient supply of the nervous influence, in which the bladder is found not only to lose its tone, but also to become diseased on its internal surface, independent of the use of alkalies. In one instance, a lady whom I attended, and who had declined into a state of complete paralysis, having lost all power of motion and feeling in the body, as well as limbs, remained in this situation for more than six weeks, during which period I was obliged regularly to draw off the water. The urine had most frequently an oily appearance, and was usually of a deep brown colour, with a peculiar alkaline odour, so fœtid as to render the apartment almost insupportable, a circumstance which was attributed to an altered state of the secretion from the bladder, in consequence of some disease of its inner membrane.

In the course of time, the constitution began unexpectedly to rally; the feeling first, and then the

power of motion, by degrees returned, and in six months the patient had almost entirely recovered. In a single instance only, where the bladder was affected much in the same way from paralysis, and where from the same peculiar and intolerable fœtor of the urine it was impossible to mistake its being a similar affection to that above-mentioned, I had an opportunity of examining the state of the parts after death. The appearances confirmed the opinion I had previously entertained, and as they may serve to demonstrate the nature of a particular affection of the mucous membrane of the bladder, they will be mentioned with the cases. *

Some late ingenious experiments have thrown considerable light upon the influence of the nerves, in regulating the operation of secretion; and considering the results of these experiments, together with the above circumstances arising from disease, it seems most probable that in these instances the routine of changes first began with some deficiency in the quality of the secreted mucus, which is obviously provided as the natural defence of the inner membrane of the bladder, from the irritation of the urine; and that the long continued excitement arising from this defect in the natural actions of the membrane, conjointly with the increased power of irritation in the urine, incident to confine-

* See CASE 14.

ment in bed, had produced an attempt at inflammation, which, from the deficient energy of the parts, had sunk into exhaustion and loss of vitality.

Sect. 11.

Of adherent Calculus.

It has been observed that in severe irritation of the bladder arising from gravel, the inflammatory action will occasionally proceed to such an extent as to end in effusion of coagulable lymph upon the inner membrane, and under these circumstances it is not unusual to find the calculous matter adherent to those parts upon which the effusion has taken place. Very much the same kind of thing occasionally takes place in affections produced by stone, in which the irritation excited either by the calculus itself, or by some other cause, is productive of an effusion of coagulable lymph, the surface of which, connecting itself with the stone, becomes the bond of union between it and the coats of the bladder. In one case * this event was ascertained to have taken place in consequence of irritation at the neck of the bladder, produced by injecting to cure a gonorrhæa; although it is more generally the result of the irritation excited by the stone itself.

* Related by Sir E. Home in his Practical Observations on Stricture.

It does not appear that the texture of the calculus has any material influence either in promoting or retarding this process of adhesion; for in the case just mentioned, it had taken place with a calculus, the surface of which was composed of the phosphates, and in another instance, which will be more particularly spoken of with the cases, the medium of adhesion had very firmly united itself to a calculus of oxalate of lime. *

The circumstance of a calculus being adherent to the coats of the bladder may in some instances be tolerably well ascertained, in the operation of sounding; for the sensation conveyed by the instrument will be pretty clearly that of a calculus confined to a particular part of the cavity of the bladder, allowing the sound to strike against it, and pass by. In other cases however there is no intimation of this sort, at least none sufficiently clear to be at all depended upon, nor indeed, would it, if known, materially interfere with the adoption of the means necessary for relief, although the adhesion of a calculus certainly lessens, in some degree, the probability of a favourable issue to the operation for lithotomy.

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* See CASE 12.

Sect. 12.

On the Operation of Lithotomy.

The performance of the operation for the removal of a stone from the bladder is frequently our only resource, it appears however to be a measure warrantable under certain circumstances alone.

In the first place it must not only be clearly ascertained that the symptoms have been produced by calculus actually in the bladder, from its having been repeatedly and distinctly felt by several persons, with the metallic sound, or other instrument passed into the bladder; but it must be also distinctly felt by the sound or staff, at the commencement of the operation, for a stone that has been long lying loose in the bladder may subsequently become encysted, and if this change takes place just before the operation is performed, the surgeon may be completely foiled in his attempts to find the stone; and as to the sensation produced by passing the end of the sound over a rough calculous surface in the cavity of the bladder, even this may prove deceptive; for it has happened that a patient has been regularly and repeatedly examined by various surgeons, and the sound has been clearly perceived to strike and grate upon a calculous substance, and yet upon the operation being performed, there has been no calculus found, the whole of the mischief having

been the result of gravel, that had excited partial effusion of coagulable lymph upon the inner surface of the bladder, which becoming subsequently encrusted with calculous matter, had given the peculiar sensation conveyed by the sound, and mistaken for the contact of a stone.

In the second place, the state of the patient's general health must be considered, previous to determining upon the operation. If the constitution appears good, with the exception of such symptoms as are known to be always produced by the irritation of calculus, proper medicines, aided by rest, will generally succeed in bringing things round into a state favourable for the operation; but when in examining by the rectum the prostate gland is ascertained to be much enlarged, or is known to have been long diseased, where there have been fistulous abscesses in perinæo, with disease in the urethra, where there has been extensive sympathetic distress, connected with tedious and racking fits of pain in the lumbar region, such as are known to be generally produced by calculi in the kidneys, or where from any other cause the strength of the constitution is essentially impaired, the operation should not be recommended, neither should it be performed, unless at the earnest solicitation of the patient; much however, in the determination of these important questions, must rest with the professional talents and judgment of the surgeon.

Sect. 13.

Of the Appearances and Structure of Urinary Calculi.

There is considerable variety in the appearance and structure of the calculi met with in the urinary bladder. It has been already observed that the concretions usually formed in the kidneys are principally composed of uric acid; but calculi that have been produced in the bladder are commonly found to be made up either of phosphate of lime, or the triple phosphate; unless they assume the mulberry form, when they consist of oxalate of lime; or where a nucleus of uric acid has come down from the kidney, while the urine has still continued to be loaded with an excess of uric acid, in which case the deposit commenced in the pelvis of the kidney, continues to increase in the cavity of the bladder, and in this way the uric calculus has become much larger, previous to the cessation of the secretion of an excess of uric acid. When however this peculiar action has once subsided, the future increase of the calculus most frequently depends on a deposition of the phosphates. In occasional instances however, the increased secretion of uric acid has returned at intervals, and in these cases the calculus has been found to be composed of alternate layers of uric acid and the phosphates.

The nucleus of a calculus from the bladder is generally formed of uric acid, a circumstance that always argues the stone having been originally derived from the kidneys*. It is much less common to find the central part composed of a little loosely agglutinated ammoniaco magnesian phosphate, the surrounding mass consisting of the same substance, together with variable proportions of phosphate of lime; but the most rare, and perhaps the most pure species of urinary concrete, is the mulberry calculus, which frequently consists throughout of little else than oxalate of lime.

Where, from accidental circumstances, any extraneous body has made its way into the bladder, the deposit that takes place around it is found to be a mixture of the phosphates; and in this way a small coagulum of blood, a common pea, a hazle nut, a needle, or a bougie, have each of them occasionally become the nucleus upon which calculous matter has been precipitated.

The external characters of urinary concretions are various. Those that are composed of uric acid, are easily distinguished by their red or deep yellow colour; they may have a smooth surface, but it is frequently rough and warty. Such as contain the uric acid deposited in combination with the ammoniaco magnesian phosphate, are of a pale or grey

* See Calculus, PLATE I. *Fig.* 4.

colour, with a smooth, and frequently a crystalline surface. There are some that consist of oxalate of lime, and these are easily known by the protuberances and inequalities upon the surface, whence they have received the name of mulberry calculi; in their superior compactness and weight, and in their darker colour, they differ from the other kinds of urinary concretions.

When a calculus is carefully divided with a fine saw, the exact arrangement of its internal structure is at once exhibited. The central part or nucleus is in the majority of cases found to be uric acid, the surrounding laminæ being made up of the phosphates, either intimately combined, or alternately disposed, although occasionally the uric acid, and the phosphates, are laid in succession throughout the whole bulk of the calculus, but in this case the uric acid is usually found in less abundance than the other constituents.

CHAPTER IV.

ON THE TREATMENT OF DISEASE IN THE BLADDER.

SECT. 1.

On the Treatment of Irritation from Gravel.

IN the preceding observations, most of the affections to which the urinary bladder is subject, have been considered as symptomatic of some other complaint, upon which account the treatment of the symptoms arising from the state of the bladder must commonly be regulated by those principles that are most applicable to the removing, or at least relieving, the original disease.

This is particularly the case in such instances of irritable bladder as depend on the excessive secretion either of uric acid, or the phosphates, by the kidneys, under which circumstances the treatment likely to answer best in relieving the affection of the bladder, will be that which is adapted to correct the secretion from the kidneys; and the means best calculated to answer this purpose have been mentioned in the treatment of affections of the kidneys.

Where however irritation in the bladder has attained a certain point, it may be necessary to have recourse to some further measures for its relief, than those which are merely directed to the removal of the original cause of the complaint. In these cases our principal means of alleviating the sufferings of the patient may be said to be opium, and opium alone. The preparations of this invaluable remedy may be sometimes so exhibited as to afford him infinite comfort; and to these may be joined the occasional use of the warm bath, or perhaps the hip bath only, with rest, and a careful attention to the state of the bowels.

In the consideration of the symptoms and changes that arise in the state of the bladder from the long continued irritation of calculous matter or gravel, the gradations in the appearances of disease were traced through what is commonly the progressive consequence of many years ill health; and in all these progressive stages of decline, our principal dependance for relief is still upon opium. It may be given internally, either in substance or tincture, but in either case it will require to be repeated at regular intervals, in order to keep up the beneficial influence in the constitution. The tincture of opium may be exhibited as an injection, sixty or eighty drops in some warm thin starch or gruel with a table spoonful of olive oil, being thrown up twice

a day; or the opium in substance may be introduced into the rectum.

Where however the preparations of opium prove objectionable from their confining the bowels, the extract of hyoscyamus may be employed instead of it, and may be given at first in doses of five or six grains. This remedy has been very highly recommended for its influence in allaying irritation of the bladder, while it has the additional power of preserving a gentle relaxation of the bowels; but its effects must be watched, and the mode of exhibiting it, must be of course varied conformably to the state of the pulse, and other circumstances. The extract of aconite also, has in some instances, proved an invaluable remedy in relieving this kind of irritation.

Sect. 2.

On the Treatment of Irritation from Stone.

Where an irritable state of the bladder arises from calculus, the means proposed in the way of treatment, must be either palliative or radical. By the use of palliative measures we may succeed in removing the symptoms produced by the stone, but the radical means are so far superior, as that they have for their object the removal of the stone itself.

Among the palliative means may be enumerated the various preparations of opium, the various preparations of the alkalies, such as lime water, soap,

acidulous soda water, and caustic alkali, and occasionally the exhibition of tonic and stomachic medicines. All these remedies are occasionally useful in relieving the severity of the paroxysm, or fit of the stone.

From the power which the alkaline solutions possess in dissolving the concretes of uric acid out of the body, it was long believed they might be so exhibited as to effect the same desirable purpose while the calculus yet remained in the bladder; but all the experiments that have been made with this view have turned out unsatisfactory and fruitless; and their failure, when taken internally, has been attributed to the alterations produced by the act of assimilation, and the passage through the circulation of the blood.

The French chemists indeed have proposed getting over this difficulty at once by injecting the solutions of the alkalies directly into the bladder, by the urethra; but after having been repeatedly tried in this country, the practice is now entirely abandoned as useless and pernicious, not dissolving the calculus, but permanently injuring the bladder.

Sect. 3.

On the various Modes of performing the Operation of Lithotomy.

The only radical means known, or those by which the stone may be removed from the bladder, are the various modes of performing the operation for lithotomy.

The operation for the stone has been variously performed at various periods of time, and most of the alterations that have successively been made, may be considered as so many improvements in the art of surgery.

The earliest idea was that of cutting out the stone at the perinæum. Two fingers of the left hand were introduced into the rectum, to enable the operator to press the stone forward against the perinæum, and the wound being made with a knife, was enlarged to a sufficient extent to allow the calculus to be protruded into it; and the stone being then hooked out, the operation was finished. This was the mode adopted and described by Celsus.*

But the operation performed in this way was liable to many objections and dangers, the principal of which was removed by Fabricius Hildanus

* Lib. vii. cap. 26.

who first proposed the introduction of an instrument by the urethra into the bladder, to serve as a director in the operation. There were however still several considerable difficulties in cutting through the perinæum, so that it was at length proposed to extract the stone by a wound made into the upper part of the bladder, by cutting above the pubis and this mode of extracting was distinguished by the name of the High Operation. It was first introduced by Pierre Franco, in the year 1561; but the obvious risk of opening into the general cavity of the abdomen, and the consequences likely to ensue from this accident, were so many dangers and objections which prevented this mode of operating ever being generally adopted.

The original idea of the operation at present in use, appears to have been derived from that which was proposed and practised in France by Frere Jaques a monk, who in 1697 taught in Paris his method of cutting for the stone. He passed a large staff into the bladder, and with this to direct him he plunged a short dagger-shaped knife at once through the perinæum into the bladder, and then removed the stone with the forceps. The striking feature of improvement in this operation was the superior boldness and decision with which it was performed, by which an ample and adequate wound was promptly made into the bladder, instead of having recourse to the means previously in use,

for dilating or rather tearing open a small and inadequate wound. Frere Jaques latterly adopted the grooved staff in operating; and it is astonishing how constantly successful his operations were, subsequent to this period.

Cheseldon performed the operation of lithotomy by dividing the same parts that are now cut through with the gorget; but he chose to make his section in the opposite direction, and instead of exposing the groove of the staff at the membranous part of the urethra, as is done in the present day, and then dividing the prostate and body of the bladder, he struck his knife first into the bladder, found the groove in the staff, and so divided upwards, cutting through the prostate gland and neck of the bladder; by these means he was sure to avoid any risk of wounding the intestine.

Sect. 4.

On the present Methods of operating for the Stone.

Sir Cæsar Hawkins first introduced the use of the cutting gorget; and the following account of the present mode of operating with that instrument, will be found to differ in no material circumstance from the operation, as performed by that surgeon.

With a view to the performance of the operation of lithotomy, some preliminary attentions may oc-

casionally be required. Should the patient be of a full habit of body, some blood may be taken from the arm two or three days before, and a purge also be given. A few hours previous to operating, an injection ought to be thrown up, to ensure the rectum being empty, and diminish the chance of its being wounded in the operation.

It is generally considered an advantage, that the bladder should be partially distended with urine at the time of operating, on which account the patient should retain his water for some time before. It is also essentially necessary that all the instruments that may possibly be wanted in an operation of so much importance should be ready at hand, and laid in order on an adjoining table.

Those instruments that are or may be required, will be the following; a cutting gorget, and several grooved staffs of various sizes, the groove of each being accurately fitted to the beak of the gorget; several scalpels, one of which will be necessary in the commencement of the operation; forceps of various sizes and forms; a probe-pointed bistoury for enlarging the section through the prostate gland, if the division of the parts effected by the gorget be not sufficiently free; a large syringe, either for injecting the bladder, washing out clots of blood, or the broken particles of the stone; a scoop should also be at hand, as it is occasionally

useful for the same purpose; and lastly the garters necessary for securing the patient's hands and feet.

Considerable difficulty is sometimes experienced in getting the staff into the bladder after the patient is upon the table, and as any delay at that time unavoidably lengthens the period of alarm and terror, the staff had much better be introduced, and the stone again felt so as to be certain of its being in the bladder, previous to his being bound.

The patient being placed upon the table, his wrists are brought down to the outsides of his ancles, and to be firmly secured there by the garters, the knees being bent, and the heels brought back against the buttocks.

The assistant supporting the scrotum with the left hand, is with his right to hold the staff, so as to make the curve of the instrument project towards the left side of the perinæum.

The first incision should commence below the bulb of the urethra opposite the membranous part of the canal, at the point where the operator intends to expose the groove of the staff. This incision should extend three or four inches downwards, to the left of the raphe of the perinæum, at equal distances from the tuber ischii, and the anus. The next object is the division of the transversales perinæi muscles, which is an essential circumstance in the operation. The point of the knife is then to be passed into the groove of the staff, puncturing

the urethra, and exposing the groove of the instrument as near as possible to the prostate gland, in doing which the knife should be made to divide the urethra as far as possible along the groove of the staff towards the bladder, a precaution that, if properly attended to, prevents the risk of the beak of the gorget being entangled by the soft parts, which would endanger its escaping from the staff, and passing in a wrong direction. The knife being now laid aside, and the beak of the gorget accurately and securely set in the groove of the staff, the operator takes hold of the handle of the staff himself, and raises it up from the groin till the handle of the staff forms a right angle with the body of the patient. Before pushing on the gorget however, the beak should be moved backward and forward a little, to ascertain clearly that it is fairly and freely placed in the groove. The bringing forward the handle of the staff so as to raise its point which is in the bladder, is a circumstance of the highest importance, for regulated by this the gorget, the handle of which must be somewhat depressed as it passes forward, will be so introduced as to pass on into the bladder in the proper line of the axis of the pelvis, by which care the risk of wounding the rectum is avoided.

The gorget having been introduced fairly into the bladder, may be again withdrawn, and the staff also being removed, the forceps should be imme-

diately passed, and whenever the finger can be made to reach the stone, it will prove the most useful of all directors, for the application of the blades of the instrument. Where this however cannot be done, the stone may be repeatedly touched with the blades of the forceps, previous to their being opened, so as to enable the operator not only to ascertain its precise situation, but to furnish him also with some idea of its magnitude and figure, before he attempts to grasp it with the instrument.

Sometimes the fundus of the bladder will require to be supported, and raised up a little by two of the fingers of the left hand introduced into the rectum, to enable the forceps to take a fair hold of the calculus.

In the first attempts to extract the stone, the greatest care should be taken to press the blades of the forceps together as lightly as possible, unless it has been already ascertained that the calculus is compact and hard in its texture, when this caution becomes of less importance.

The figure of a single calculus is generally more or less of a flattened oval, and where it is large it becomes an object of consequence that it should be so settled between the blades of the forceps that its long diameter or axis shall lie parallel to the length of the instrument, that it may be removed with the least possible difficulty or violence.

Many fanciful contrivances have been suggested for breaking up and crushing a stone in the bladder, where it is too large to admit of extraction, but these instruments although some of them are ingeniously contrived, have scarcely ever been found applicable in practice.

The surface of the stone, when extracted, should be carefully examined, as its appearance will generally point out whether there are other calculi or not. If any part of it is found flattened, or particularly smooth, it must probably have been the result of friction with another calculus; and the bladder must be attentively and repeatedly examined, to ascertain whether this is the case or not. The examination of the cavity of the bladder should always, as far as possible, be made with the finger, to learn whether any loose fragments of stone, any adhesive mucous deposit, or any sabulous matter remain behind; for in either case the bladder may require to be well washed out by means of the syringe and warm water. Experience has shewn that either of these substances may, if neglected, become the nucleus for a future stone to form upon.

The hæmorrhage that occurs either in, or immediately subsequent to the operation, may sometimes require either such pressure locally as may prevent its continuance, or perhaps the dilatation of the wound, in order that, if possible, the artery may be taken up. Where the first expedient will answer,

it is preferable for two reasons; it is more expeditious, and it conveys less alarm to the mind of the patient. It may be effected by the introduction of an adequate piece of firm dry sponge into the whole depth of the wound, and as this absorbs the moisture, it will continue to swell, until the bleeding subsides.

It is however necessary to recollect that when the tent is subsequently removed, the bladder should be carefully examined, to ascertain that no coagulum of blood be left within its cavity.

After the operation a simple pledgit may be placed over the wound, and retained in its place by the T bandage. The patient may then be laid in bed either upon his back or on his side, with his thighs closed, and a large opiate should be given.

Some care will be necessary in so disposing folded cloths and blankets upon the bed, as to receive the urine which flows by the wound, with as little exposure as possible to the chance of the patient's taking cold from the constant state of moisture of the parts; from the neglect of this precaution I have known an instance in which a severe cold came on, presently followed by inflammation of the peritoneum, and the patient died.

Inflammation of the bladder, extending itself to the membrane lining the cavity of the abdomen, forms one of the most serious dangers to be guarded against, subsequent to the performance of this

operation. The most unerring sign of this event is a degree of tenderness, more or less considerable and extensive, spreading itself over the region of the abdomen from the immediate seat of the urinary bladder.

Should this peculiar tenderness arise, the pulse, which in this case generally proves deceitful, must not be at all depended upon; it will feel weak, small, and languid, but leeches repeatedly applied, and even the lancet, if the pulse will at all admit of it, together with fomentations, aperient medicines, and the strictest abstinence, will form the plan on which we must depend for saving the life of the patient.

The gorget is, on some accounts, a convenient instrument, but many surgeons are of opinion, that from its having been repeatedly found, even in the most expert hand, liable to slip from the staff, or without this accident subject to inflict a second wound through the bladder, it should be altogether laid aside; particularly as the operation may be just as well performed by the knife alone.

An ingenious mode of operating with the knife has been described*, in which the operation commenced as for the gorget, is finished by means of a second staff introduced through the wound in the membranous part of the urethra, the knife

* By Mr. Allan Burns.

and the staff being brought out together, by the perinæum; and this, if properly executed, prevents the possibility of accident. But the fact is, that if the surgeon is sufficiently attentive and careful in operating, there can be no occasion for a second staff at all; for if the first incision is conducted in the manner above directed in operating with the gorget, and the first opening which must be freely made by the scalpel, in the membranous part of the urethra, be then carried through the prostate gland, and as much as is necessary of the exposed part of the bladder, by setting the back of the knife towards the groove in the staff, the operation will be finished in the manner in which I have myself in one case performed it with success, and in the manner that has been already recommended by one of our best surgeons.*

Sect. 5.

On the Performance of the Operation in the Female.

The performance of the operation of lithotomy is but rarely if ever necessary in females, a circumstance which arises from the organization and functions being more simple in the female, than in the male urethra.

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* Mr. Laurence.

The office of the urethra in the male is twofold; it affords a constant conveyance for the urine, when the bladder is emptied of its contents, but it has also another important duty to perform, in the occasional expulsion of the semen, and for the performance of the latter of these functions, a complex structure in the parts immediately surrounding the canal was required; while the only purpose of the female urethra is that of allowing the contents of the bladder to pass off, upon the natural impulse being given, for which reason the female urethra is extremely short, of very simple structure, and is capable of being dilated to a degree that, unless the fact was well authenticated, could scarcely be believed.*

Should the symptoms of stone in the female require the removal of the calculus, the first thing to be done is to tranquillize any irritation in the bladder by the means above pointed out, after which the urethra may be gradually dilated by the introduction of a sponge tent, until it will with ease admit the fore finger, when the calculus may be so examined as to enable the operator to judge very accurately how far further dilatation may be expedient, for the purpose of admitting the removal of the stone, or how far it may be rather

* See CASE 13.

advisable to divide the neck of the bladder, so as to allow the calculus to be at once withdrawn.

It has by some been objected to dilatation, that it leaves the fibres of the sphinctor muscle less capable of recovering their power of contraction, than the division by the knife would do; while on the other hand many surgeons entertain the contrary opinion, and maintain that the patient is at least as likely to recover the power of retaining the urine subsequent to the process of dilatation, as she would be from the section of the bladder required for the immediate extraction of the calculus.

Where the operation is performed, it only requires that a grooved director or female staff be introduced by the urethra into the bladder, when, with the cutting gorget, or the knife, the lateral parts of the vagina being carefully kept out of the way, the section may be effected to the necessary extent.

Sect. 6.

On the Treatment of Irritation from Sympathy.

Where an irritable state of the bladder has been produced by sympathy with surrounding parts, the treatment must be entirely regulated by the nature of the original disease. In one case of contraction in the rectum, a constant sense of uneasiness and pain in the seat of the disease, with the greatest

difficulty and distress in passing motions, connected with constant sickness at stomach, and general nervous irritation, at length induced an irritation in the bladder, which continued for several weeks; but by the occasional introduction of a bougie through the contracted part of the intestine, the state of nervous disturbance being constantly attended to, and carefully held in check by the exhibition of opiates, and by the variation of the interval of time allowed to pass between the operations, all the symptoms were eventually removed; the stricture was so effectually dilated, that it gave no inconvenience, except when the bowels happened to be exceedingly confined, the general disturbed state of the nerves subsided, the irritation of the stomach subsided as well as that of the bladder, and the lady remained free from any return of these complaints when I heard from her five years afterward.

Where irritation has been brought on by cancerous affections of the uterus, our only dependence is upon opium; aided by all those little attentions, both as to manner and conduct, which tend very materially to sooth the feelings of the patient, and to diminish the severity of affliction, notwithstanding they can have no power in arresting the progress of a fatal disease.

When irritation of the bladder has been produced by the improper treatment of gonorrhœa, the object of course will be to undo as quickly as

possible, what has been done. If the discharge from the external orifice of the urethra has disappeared, the warm bath and fomentations will tend to its restoration; and to these means, if necessary, may be added the application of some irritating matter, such as the bals. copaibi, to the urethra, by means of a bougie. The regular introduction of the bougie also will be indispensable, should the violence of the preceding inflammation be found to have brought on a contraction in any part of the canal.

It has been observed above, that the only instances in which I have been able to trace disease of structure arising spontaneously in the coats of the bladder, were in cases of fungus hæmatodes. In these the common symptoms that arise from irritation in the bladder, were the only decided characters that attended the production of the disease. Towards the latter periods, however, there was occasional bleeding in the one case, and more severe hæmorrhagy in the other; but in neither was it possible, during the life of the patient, to form any clear or satisfactory opinion as to the precise nature of the complaint.

In this disease we have little in our power, as in this, like the other affections of the bladder approaching to the nature of cancer, there are no means at present known to be within our reach, for attempting the removal of the disease. Our

object therefore, in the way of treatment, must be to alleviate symptoms as they arise, although with a very slender ground for hope as to the eventual success of our exertions.

Case 10.

Irritable Bladder, with cancerous Disease. *

December 15, 1796, I was desired to see a Mr. Lee, a gentleman who it was suspected had a stone in the bladder. On enquiry he gave the following account of himself. He said he had been all his life a very regular and temperate man. Once while young, he had had a mild gonorrhœa, which was soon cured. For the last two years, he considered his health had been on the decline. This he principally attributed to anxiety of mind, connected with affairs of business. He said that for the last two or three months he had found difficulty and pain in making water, and that twice within that period, he had had a retention of urine, which was relieved by proper medicines.

His present complaints were a frequent inclination to make water, attended with much straining, constant irritation at the neck of the bladder, and a greater or less discharge of viscid mucus,

* The following case with the diseased parts, are preserved in Mr. Heaviside's museum.

when he had nearly passed his water, which was sometimes streaked with blood, but not always. Having heard this account, I told him it was difficult to say positively what the nature of his disease might be, unless he allowed me to examine his urethra and bladder. He readily gave his consent, and I passed a middle-sized bougie into the bladder, but not easily, having met with two or three obstructions in the way. I then introduced a sound into the bladder, and endeavoured to ascertain whether there was a stone, but the sound felt so firmly wedged in, that I could neither move it one way or the other. I therefore very carefully withdrew it again, and a considerable hæmorrhage followed. It was not introduced afterward.

Dr. Crichton and Mr. Lucas were present at the above examination. We were all of opinion that there was some disease of the bladder, but what the disease was, it was not so easy to determine.

I did not see him again for several days, during which time Dr. C. prescribed for him. The Dr. then desired me to call upon him again. I found him rather worse than I had left him. He was passing his water generally every hour, and sometimes oftener, with great straining and irritation, together with a discharge, sometimes more, sometimes less, of a glairy and bloody mucus. Added to all this misery he had a teasing diarrhœa, with

prolapsus ani; was very much reduced, and had very little appetite.

Still entertaining an idea that stricture had a considerable share in producing his complaints, I passed a full-sized bougie up the urethra for about three inches and a half, where it stopped. Convinced that whatever might be the nature of the disease in his bladder, no benefit could arise till this obstruction was removed, I proposed to touch it with the lunar caustic. To this he was somewhat averse, fearful it might bring on more irritation. I assured him it was more likely to diminish it. He therefore submitted, and the caustic was applied on the twenty-fifth of December, and all the uneasiness he experienced from the application was a heat, merely local, which continued for about half an hour. In consultation it was agreed to continue this plan.

I applied the caustic every second or third day, till I had touched the stricture with it seven or eight times, and had so far gained ground as to be able to pass a full-sized bougie as far as the bulb of the urethra, but not beyond. I would willingly have persevered with the caustic, but from the sleepless nights, and repeated calls to make water, added to the diarrhæa and the prolapsus ani, he was so much harrassed and worn out, that he begged I would not only never attempt it again, but never even mention it to him, adding that the very

idea of the operation brought on an urgent desire to make water. I accordingly desisted.

He continued in this deplorable state, or rather constantly getting worse, for about three weeks, when he died, emaciated to the greatest possible degree.

Examination.

On opening the body, all the viscera appeared sound except the bladder, which was completely diseased, and in many parts disorganized. The peritoneal covering was entire, but when this was divided, the remaining coats of the bladder were in some places perfectly destroyed, and in others converted into a loose membranous, fungous, or cancerous structure. Towards the fundus of the bladder, the muscular coat, as well as the inner membrane were entire; the healthy mucous secretion however, had evidently been deficient for some time before death, as the surface was crusted over with sabulous sandy matter.

The ureters were considerably distended with urine, and rendered very thin. The rectum contained a good deal of fæces, and was indeed very much enlarged from the accumulation of excrementitious matter.

Case 11.

Extreme Irritation of the Bladder, from Stricture in the Rectum.

J. Ward, a labouring man, aged 52, first complained in December 1809, of pains in the back and loins. These pains increased, producing him much distress, till at length they prevented him from walking erect. The pain would sometimes shoot forward to the groin on the left side, where, after some time, it established itself as regularly as about the small of the back.

He had complained of these symptoms for about a month, when he began to experience pain in passing his water. It flowed freely enough, but the expulsion of the last drops was attended with severe pain, and violent straining. The affection at the neck of the bladder in the course of a few weeks became so severe, that the agony he suffered, was almost insupportable.

He now observed that his bowels, though formerly very regular, were becoming much less so; for he often required physic, and even with this assistance he was frequently several days without a motion. Almost three months had in this way passed, when he applied for assistance to the St. George's Infirmary. As he complained of distress in making water I was desired to see him. His

symptoms at this period were severe pains in the back and groin, extending down one thigh so as to produce lameness. On examining the groin, there was no appearance of disease, but as the bowels were much confined, he was ordered some physic.

The distress in making water still continued to increase, and a deposit was now observed in the urine, which, on settling, formed a thick, dense, white sediment, in considerable quantity. He was perpetually disturbed through the night, as well as day; and when the irritation was most urgent, it brought on an irresistible desire to pass a stool; the efforts to this effect however, though extremely violent, were always fruitless.

To ascertain the state of the urethra, a large-sized bougie had been introduced when I first visited him, but no stricture was found. A bougie was now again passed, without any more satisfactory result. There was no sensible obstruction in the prostatal part of the urethra, but as the affection was evidently situated at the neck of the bladder, it appeared right to examine the state of the prostate gland by a finger in the rectum. I did so, and in this way accidentally came at once upon the original disease. There was a firm contraction of the intestine, just within reach of the finger. The pain and distress produced by the examination was so great, that it was very clear,

so irritable a disease would not bear the application of the common bougie. A wax taper therefore, moulded to the proper curve of the rectum, and anointed with oil, was introduced and passed beyond the stricture, where it was allowed to remain for half an hour.

After an interval of some days, the operation was repeated, but subsequently the wax was exchanged for tallow, with a view to the bougie gradually softening, so as to allow the parts gradually to subside into a state of quietude. This proved to be the only tolerable mode of operating upon the stricture, by pressure. When the feel of the strictured part was particularly examined, the inner membrane seemed to be puckered up into numerous ridges and folds, external to which the coats of the intestine were evidently very much thickened, as well as contracted. The bowel was also found to be attached to the sacrum, so that it was not capable of any lateral motion, but felt as firmly fixed as if closely encircled with bone.

He still continued to suffer violently as ever, from the irritation in the bladder; the pain in the left groin and down the thigh had produced so great a degree of irritation in these parts, that he could scarcely endure the pressure of the bed-cloaths.

A new source of distress now arose, this was a frequent and severe pain in the diseased intestine,

which came by fits and starts, and seemed, from his description, to be principally of a spasmodic nature.

On the 20th of March, he was in every respect declining. The left spermatic process was exceedingly tender, and, on the slightest pressure extremely painful; it was also somewhat enlarged, and harder than natural. The lymphatic glands upon the affected side were exquisitely tender, but were not otherwise affected. To ascertain whether the disease was likely to be at all relieved by the local treatment, the parts were again examined, when it appeared that so far from being at all benefited, the disease was fast spreading. The tremor, and universal agitation into which he was thrown by the extreme pain incident to the examination remained upon him, as it usually did after the introduction of the bougie, during the whole of the day.

The pulse notwithstanding was undisturbed, and generally about seventy. On the 26th, he thought that the pain in the rectum was materially better, but that as related to the difficulty and urgency of contraction in the urinary bladder, he was very much worse.

The pressure against the stricture was again increased, by the occasional introduction of the wax bougie.

On the 10th of April, the extreme agony and increasing obstinacy of the contraction in the stricture, rendered the attempt to pass a bougie, unadviseable. For the last five days there had been no passage through the bowels. The stomach was in so irritable a state, that it rejected every thing nearly as soon as it was taken. A laxative injection which was thrown up into the rectum, came away without having been able to pass the stricture. An occasional convulsive hiccup now came on, which added greatly to his distress.

For some weeks a degree of swelling had been forming in the cavity of the abdomen, which evidently contained water. He complained much of general as well as local pain, with great heat, thirst, and restlessness. The pulse had become very small and weak, and beat 100 in the minute. On the 14th he died.

Examination.

Several quarts of serous fluid formed the tumor of the ascites. The whole of the intestinal canal was altered in its structure. The principal seat of the affection was apparently the muscular coat. The intestines felt somewhat like leather. They were so much altered in their texture, that when cut into, the section of the coats exceeded one-eighth of an inch in thickness. The general co-

lour was a red or mottled brown, in no part crowded with vessels.

At the upper part of the abdomen, connecting the stomach to the colon, was the omentum completely diseased. The whole of the omentum was exceedingly contracted in its dimensions, but was rendered extremely thick. To the touch, it felt like a cartilaginous substance. The disease in this part was irregularly tuberculated, and when cut into, the small honeycomb spaces between the membranous septa, were in some parts filled with a matter resembling cream, in others with a substance of more firm consistence. The general structure of the stomach exactly resembled that of the intestines. At the pyloric orifice, upon that side next the less curvature of the stomach a very extensive scirrhus disease was found. The scirrhus when divided was more than half an inch thick, and it is curious that the affection was entirely confined to the one side of the circle of the pylorus. The villous coat of the stomach was entire, but more vascular than in its natural state. The disease seemed to have left the peritoneal coat of all the viscera unaffected.

The lower part of the rectum presented the largest mass of disease. At the upper part of the pelvis, this intestine was firmly fixed to the spine and sacrum by a very extensive thickening of parts around the gut, the coats of which were com-

pletely converted into a cancerous structure; although it was impossible, by the external appearance, to determine what proportion of the general mass of the disease was formed by the intestine.

The whole was dissected out from the pelvis, and the anterior line of the intestine then laid open from the anus upwards, through the contracted part, by which means the stricture was brought fairly into view. It appeared that the contraction had commenced about five inches above the anus, and had extended itself upwards and downwards, until at length a passage through the strictured part became impracticable. The disease, from the villous coat to the external margin of the section, measured three-fourths of an inch in thickness.

The cancerous disease by which the intestine was surrounded was firm as cartilage; in structure this disease exactly resembled that of the pylorus.

The urinary bladder exhibited the consequence of long continued and violent irritation from sympathy. Its structure was undiseased, but it was exceedingly contracted, and consequently much thickened in its coats. The cavity was scarcely capable of containing a table-spoonful of fluid. The inner membrane was astonishingly vascular, and of the brightest scarlet colour.*

* See Bladder, PLATE 2. *Fig.* 2.

Case 12.

Mulberry Calculus adherent to the Bladder.

George Rogers went through the operation of lithotomy when he was twenty-four years of age. From his childhood he had been very subject to uneasiness, and sometimes the most severe pain in passing his water, which for many years had occasionally deposited red gravel and sand. In the year 1800 he consulted a surgeon *, who from his symptoms had reason to believe there was a stone in the bladder. A sound was accordingly passed into the bladder, and the calculus distinctly felt. His habits of life were frequently intemperate, and he was sometimes inconvenienced by slight asthmatic attacks, but in other respects his health was tolerably good.

He was recommended to undergo the operation, and it was performed on the 15th of February 1800. On cutting into the bladder, the calculus was found, but it was firmly adherent to the coats of the bladder, near its neck; the adhesion however, was by degrees loosened, and the stone was safely brought away by the forceps.

On examination, the calculus proved to be oxalate of lime, and upon the least uneven part of its

* Mr. Heaviside, who afterwards performed the operation, and in whose museum the calculus is preserved.

surface was a soft substance, closely attached, which had formed a part of the medium of adhesion. This substance, from its appearance and texture, was evidently nothing more than coagulable lymph, effused as the accidental consequence of preceding irritation.*

The young man recovered perfectly from the operation, and lived thirteen years after it, without experiencing any return of calculous symptoms. Latterly, he was much addicted to drinking, a circumstance that probably aggravated the severity of his asthmatic complaint, of which he died in November 1813.

Case 13.

Singularly large Calculus, voided spontaneously from the Urethra of a Female.

Among the rest of the specimens, in a collection of near 400 calculi †, is a concretion of very considerable magnitude. It is remarkable from its appearance and structure, but more particularly from the circumstances of the history which is annexed to it.

It was formerly in the possession of Mr. Watson, in whose hand-writing the account of the case

* See Calculus, Plate 3. Fig. 1. & 2.

† In Mr. Heaviside's Museum.

stands. His memorandum states that the calculus was received together with the following particulars by Dr. Gray, from Dr. Alonzo de Cavallo, a physician at Lisbon, and a fellow of the Royal Academy there. He received it from his brother, a surgeon at Bahia in Brazil, at which place it was voided without any medical assistance by an old black woman. Previous to its coming away she had for a long time suffered excruciating pain, and remained ever after subject to an incontinence of urine. Dr. Gray received no other particulars.

The calculus itself is partly of an oval figure. It weighs four ounces and six drachms, troy weight. The section exhibits a loose crumbly texture composed of a small proportion of the phosphates, with a large one of mucous or animal matter, forming the nucleus of the stone, round which to a certain extent the phosphates have been deposited, in successive strata. Subsequently however, it appears from the structure, that the calculus took up some comparatively fixed place of abode in the bladder, in consequence of which the stream of urine making its way constantly over one part of its surface only, has given rise to a partial accumulation of phosphate of lime upon one of its sides. It appears probable also, that the large spaces between the masses that form the external part of the calculus must have been owing to the particular consistence of the mucous matter at these points, around which it

seems the phosphates were deposited, according to the accidental figure of each of the little masses of tenacious mucus.*

My having lately seen a very interesting account† of a calculus of extraordinary size that was voided under much the same circumstances, has operated as an inducement to bring forward the above particulars, as it appears to me that the two cases together form an exceedingly curious and striking parallel.

Case 14.

Diseased Urinary Bladder.

In September 1809, a woman in the 52d year of her age died in the Infirmary belonging to St. George's workhouse. She had been long in a very infirm state of bodily health, and her mental faculties had almost entirely failed. For the last six weeks of her life her stools and urine passed involuntarily, she never however seemed to suffer pain. During this period her urine was observed occasionally by the nurse, it was always very thick, extremely offensive, and occasionally tinged with blood.

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* See Calculus, Plate 3. *Fig.* 3.

† By Dr. Yelloly, in the 6th volume of the Medico-Chirurgical Transactions.

For sixteen days previous to her death the urine ceased to flow, and it was therefore removed at regular intervals by the catheter. The urine gradually assumed the dark red or brown colour of putrid blood, and became insupportably offensive, so that at last the room in which she lay could scarcely be endured after the water had been drawn off.

It is curious that for the last week of her life, whenever the catheter was introduced, she had a regular attack of rigor, resembling exactly the first stage of a paroxysm of intermittent fever.

Examination.

On laying open the cavity of the abdomen, the only appearance of disease was about the urinary bladder. The kidneys were in every respect sound. The capacity of the bladder appeared externally to be unusually great. This viscus after death is usually found contracted upon its contents, the size of it being proportioned to the quantity of contained fluid. In this instance however, it lay flaccid, nearly empty, without tone or disposition to contract; neither did it appear that this was the effect of mere paralysis, but was much more probably the consequence of disease, for the coats of this bladder, considering the degree to which it was relaxed, were at least four or five times the natural thickness, whereas we

know that in paralysis all muscular parts become wasted.

Upon cutting into the bladder the internal or mucous membrane was found completely diseased. This membrane in parts was highly vascular, but the prevailing tinge was a dark olive or grey colour. In some parts the surface was evidently ulcerated in small superficial spots, in others the membrane was black and putrid.

A few ounces of extremely fœtid, red, turbid fluid were found in the cavity of the bladder, which without any further relaxation would have contained at least a quart.

Case 15.

Fungus Hæmatodes of the Bladder.

Ann Burrows, aged 57, applied to the St. George's Infirmary for assistance in the beginning of August 1813; the following were the particulars of her account. In 1805 her menses finally left her, and for seven years subsequent to that period she had enjoyed good health.

About this time she began to be affected with a smarting uneasiness and pain in making water. The complaint gradually increased, so that in the course of six months it was sometimes attended with severe straining, and she frequently observed when the sense of bearing down was most urgent

that more or less of blood came away with the urine. For this new symptom she took some medicine, which, to use her own words, only seemed to "bring down the blood" more freely and frequently than before. Thus she went on, her complaints still continuing gradually to increase.

For the last three months previous to her application at the Infirmary she had been greatly distressed by wandering pains about the loins, and these latterly became more fixed and settled in the hips. The irritation to pass water was now so constant and severe as to reproduce the efforts, which were attended with the most severe straining about every ten minutes. Position made no difference, for it returned as regularly through the night as in the day. When the pains were most violent she generally passed a little pure blood with her water in small quantity.

The poor woman had about this time been persuaded by an acquaintance, to sit over the steam of warm water, with a view to relieve her pains. This expedient seemed at first to produce some degree of ease, but eventually it was found only to encrease the hæmorrhage, and she consequently gave it up.

An examination was made per vaginam, but the enquiry afforded no clue to the nature of her disease, for the vagina and os uteri were in a perfectly natural state.

She was herself disposed to consider her pains were rheumatic, because they were still occasionally a good deal connected with the loins, upon which account she begged to be allowed to apply a blister to the loins, and one was ordered. Upon the blister taking effect she for the first time felt, and mentioned something of a swelling that was taking place in the lower part of the belly. Upon feeling the parts the following day the tumor was evident and considerable; it was fixed and firm, situated in the region of the bladder immediately above the pubes; it felt as if firmly fixed to the bones of the pelvis, and was nearly as hard as a scirrhus disease.

From the long course of preceding hæmorrhage from the bladder, and from the feel of the tumor, there seemed to be some ground for suspicion that it might be produced by a mass of coagulated blood filling up the cavity of the bladder, added to which, the external feel of the swelling a good deal resembled that of a case already mentioned, in which the bladder was found full of blood. *

She fancied the blister had somewhat relieved the pain in the back, but not that in the bladder, although she did not find herself in more pain, either about the bladder, or between that and the loins, upon the appearance of the tumor, than she had been before.

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* See Page 60.

The pains were exceedingly violent, but she never admitted that they had the peculiar shooting or burning feel which generally forms a character of cancerous disease. The pulse was small and weak, at 120. She observed that the pains were now, and had been from the first, most constant and severe in the left side of the loins.

August 17. There was great pain and distress, constant watchfulness, and considerable fever. The tumor above the pubes was stationary. The grumous, bloody, or brown colour of the urine, which had for a few days ceased, had now returned, with an occasional deposit of a small thin coagulum of blood at the bottom of the vessel, or the occasional passage of small coagula, formed in the bladder. The turpentines had been directed in vain, and she was now ordered ætherial and opiate medicines. On the following day she expired, worn out by the long continuance of pain and irritation.

Examination.

The tumor within the abdomen was perceptible to the eye, through the external parietes. Upon laying open the cavity, a large and firm but elastic mass was found projecting upwards from the pelvis. This mass, as it had before appeared, was now found to be firmly adherent to the bones at the anterior part of the pelvis. The small intestines were

partially inflamed, and had formed adhesions with the tumor in several parts.

From each side of the tumor in the pelvis an extensive chain of diseased and enlarged lymphatic glands passed upwards upon the loins, towards the root of the mesentery. The disease had produced a more considerable change and a much larger tumor in the lymphatics upon the left than in those upon the right side of the loins. Most of these diseased glands were large as a chesnut, but many were equal in size to a small apple. As it was impossible to ascertain clearly what the large tumor was, while it remained fixed in the pelvis, the whole was dissected away from the bones, and on examination the urethra was found to pass into the tumor.

Following the natural cavity of the bladder by a probe, a section was carried through from the urethra, along the anterior surface to the fundus vesicæ; this section included a portion of the disease, which consisted of a secretion of soft white pulpy matter, into what appeared to have been originally the cellular membrane connecting the coats of the bladder. The continued pressure and the operation of the disease had given the cellular membrane the appearance of fine ligamentous fasciculi passing in various directions, while the mode in which the albuminous matter had been deposited, the secretion having been principally carried for-

ward at particular points, gave the whole mass the appearance of a congeries of smaller tumors.

The quantity of the mass varied at different points; at the anterior part of the bladder its greatest thickness was one inch, but at the lateral and posterior parts it was equal to two, and even three inches.

The structure of the disease was principally made up of the white, soft, pulpy matter, in some points resembling cream; although here and there a secretion of adipose substance had assisted in making up the quantity. In many of the smaller tumors extravasations of blood had taken place from the capillary arteries. The effused blood formed minute masses, which became apparent on cutting into the tumor; but in some it was deposited so near the surface as to be seen shining through the external membrane. The more internal of these tumors had protruded inward into the cavity of the bladder, pushing the mucous membrane before them. Several of these projections towards the cervix of the bladder had rendered the mucous membrane extremely vascular, and from these vessels, in the progress of the disease, the blood had been poured out. This was proved by small filamentous coagula being found connected with them, in the examination after death.

The extravasation of blood into the substance of these tumors had taken place to a greater extent in

the enlarged lymphatic glands than in the disease of the bladder. This was perhaps the consequence of there having been an outlet in the one situation, by which the circulation had from time to time relieved itself, which was not the case in the other. In all other respects the disease of the bladder and that of the lumbal glands was precisely the same.

Subsequent to my seeing the above case I was requested * to open the body of a lady, who had died about the turn of life. She had upon the whole been ailing for a longer period of time than the patient I had myself attended; for the progress of the disease had been much more slow. She had latterly passed blood with her urine, but for a shorter time previous to her death than happened in the above case; neither was there in this instance any tumor to be felt externally, but in other respects the symptoms were in both cases exactly the same.

On examining the body the appearances were found less striking than in the dissection just detailed, but in essential points they were very much alike. The quantity of the tumor was not above half the size in this that it was in the former case; nor was it so projected forward, or extensively adherent

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* By Dr. Hooper.

to the pelvis, on which accounts the tumor had never been perceptible through the parietes of the abdomen. The disease had in the one case extended itself upwards by the iliac and lumbal glands; in the other it had affected only those situated laterally towards the sacro-ischiatic spaces of the pelvis.

CHAPTER V.

ON THE SYMPTOMS, CAUSES, AND APPEARANCES OF DISEASE IN THE PROSTATE GLAND.

SECT. 1.

On the Situation and Structure of the Prostate Gland.

THE prostate gland is a soft body, which in figure somewhat resembles a chesnut. Its functions are of importance in the animal economy, inasmuch as they are connected with those of the other organs subservient to generation; but its principal consequence arises from its situation. Placed at the neck of the bladder, it surrounds the canal of the urethra, and although this circumstance is productive of no inconvenience while the parts remain in a healthy state, it becomes an endless source of embarrassment to the surgeon, and distress to the patient, when this gland is affected by disease.

There seems to be but little variety in the diseases of the prostate gland, for almost all the appearances that have hitherto been observed, may be referred rather to the various stages of advance that

belong to one and the same disease, than to the progress of affections specifically differing from each other.

The prostate gland is not one entire body, but a substance made up of several parts. The largest portions of the gland are placed laterally, one on each side of the canal of the urethra; and the anterior margins of these portions surrounding the superior part of the urethra, meet each other, and are connected together. Posteriorly, between the two lateral lobes, and immediately behind the membrane lining the neck of the bladder, is a smaller lobe, which, although it has long been known as the occasional seat of disease, has never until lately been demonstrated in its healthy state. *

SECT. 2.

On the Causes and Appearances of Disease in the Prostate Gland.

AFFECTIONS of the prostate gland are very rarely found to occur until after the age of 60 years. Previous to that period, either from the disturbance excited by strictures in the urethra, or from the improper management of gonorrhæa, a temporary affection of this part has occasionally taken place, but the occurrence is not common.

* By Sir E. Home in the Philosophical Transactions.

Where, from injudicious treatment, the irritation and discharge of gonorrhæal matter has been repelled, the mucous membrane lining the cavity of the neck of the bladder, and with it the prostate gland, are liable to become affected. I have known this take place in several instances. It gives rise to a peculiar deep-seated pain in the neighbourhood of the prostate gland, with an uneasy sense of weight at what the patient sometimes describes as the root of the urethra. On examining per anum the gland will, under these circumstances, feel rather full and tumid, and perhaps tender to the touch. In passing a motion also, this tenderness of the prostate gland will occasionally be attended with a shooting pain, darting up the gut, as well as a constant desire to go to stool.

The instances in which the prostate gland is affected by a gonorrhæa are by no means common, and even when they do occur, the affection, as relates to the gland itself, is of so transitory a nature, that there appears to me no good ground for presuming that such affections ever lay the foundation for future disease in the part; provided there is no complication of complaints; but where, from the improper use of astringent injections, irritation is produced in the neck of the bladder and prostate gland, together with severe and extensive inflammation in that part of the urethra originally affected by the clap, one of the worst kinds of stricture will in all pro-

bability be the immediate consequence, and the increased difficulty with which the bladder expels its contents must necessarily operate by keeping up the disturbed state of the prostate gland, and it may in this way form a ground-work for future disease.

I have in one instance seen a very curious and singular affection of the prostate gland produced by injecting to cure a gonorrhæa. It was a species of irritation, connected with a spasmodic action of the muscles surrounding the bulbous part of the urethra. As the circumstances of this case were singular and interesting, it will be again noticed in its place. *

The variety of appearances that are found when the prostate gland is affected with disease, seems in many instances to arise from some one portion being more disposed than the rest to run into an unhealthy action; for it commonly happens that either one of the lateral parts, or the small posterior lobe, takes the lead, and is found more considerably enlarged, or more materially altered from its natural state, than the other parts of the gland.

The changes to which this part is subject when affected with disease, are in some respects remarkable. It is in many instances found enlarged under circumstances in which the affection can only be attributed to the influence of cold; and the change of structure it undergoes, whether confined to mere

* See Case 19.

enlargement, or going on to the formation of abscess, is usually the result of a slow and chronic action, frequently not at all painful in itself; and when from ulceration any part of its substance is exposed, the irritation is generally productive of a growth of fungous matter; in all which circumstances the features of the disease bear a striking resemblance to the common appearances arising from scrofulous action in other glandular parts of the body.

Sect. 3.

On the Symptoms produced by Affection of the Prostate Gland.

In some instances, where an enlargement of the prostate gland takes place, the first symptom is some degree of impediment in passing the water, which impediment increases more or less quickly in proportion to the growth of the swelled part of the gland, till eventually the flow of urine is altogether prevented; which changes may either take place in connection with other symptoms rendering it probable that the affection has been produced by cold, or they may occur under circumstances that leave no room for such a suspicion.

In other instances the symptoms are from the first connected with those of irritation in the bladder, and in this case the necessity for frequently passing the water, and particularly the pain and difficulty

experienced in voiding it, aggravate very considerably the severity of the complaint. The frequent straining to evacuate the contents of the bladder necessarily tends to increase the determination of blood to the seat of the affection, and in this way hastens the progress of the disease.

If a distinctive line were drawn, it might perhaps be assumed, that in those cases in which the lateral parts of the prostate gland form the tumor, the increase of the difficulty in making water is generally slow in comparison with the increase of swelling in the gland, the affection being connected with a comparatively trifling degree of irritability in the bladder; while on the other hand, in those cases where the middle or posterior lobe of the prostate gland becomes enlarged, it must, from its peculiar situation, operate much more quickly as a cause of obstruction to the flow of urine, from its swelling up exactly opposite to the opening that leads from the bladder into the urethra; and from its being, when enlarged, more extensively and more immediately in contact with the mucous membrane lining the cavity of the bladder that membrane is more readily brought into a state of sympathy, producing excitement and irritability about the neck of the bladder.

In the early stages of an enlargement of the prostate gland the patient is generally able to pass the whole of the urine, although perhaps with some difficulty, but as the obstruction increases, this ceases to

be the case, although, from the gradual progress of the disease, this change of circumstances is almost always unperceived by the patient, so that while he is able to pass water at all he generally considers that he has the power of emptying the bladder, when the very contrary is the fact.

Where the middle lobe is the principal, or perhaps the exclusive seat of the affection, a very moderate degree of enlargement is frequently sufficient to produce a complete obstruction to the flow of urine. The swelling of this part of the gland, raising up the inner membrane of the bladder with it, is the means of forming a preternatural transverse fold of that membrane, where it is connected to the lateral parts of the gland; and this circumstance not only makes the retention of urine more complete, but becomes an additional obstacle to the introduction of any instrument into the bladder.

Sect. 4.

On the Alteration produced in the Secretion from the Gland.

When the prostate is enlarged the mucous secretion furnished by the gland, as might naturally be expected, undergoes a certain degree of change, dependant on the particular nature and seat of the affection. Under these circumstances the quantity of the secretion is usually much increased, and it

becomes more tenacious and ropy than it is in its healthy state, the urine in which it is contained throwing off an offensive odour and passing readily into a state of putrefaction.

Should the enlargement of the prostate gland have proceeded to such an extent as to create a considerable difficulty in the expulsion of the urine, the coats of the bladder having preternatural difficulties to overcome, are under the necessity of making greater exertions than before, and the muscular coat in consequence of this exertion acquires a considerable increase of strength and thickness, while the cavity of the bladder is in the same proportion diminished, similar to what happens in stricture in the urethra. When however, the circumstances of the case are complicated, and in addition to the enlargement of the prostate gland there is irritability at the neck of the bladder, the frequent straining to expel the urine aggravates the whole of the symptoms, until at length a violent degree of inflammation of the mucous membrane of the bladder takes place, the extreme excitement of which becomes in its turn a new cause of spasmodic efforts to contraction; and these efforts, while on the one hand they induce a rapid increase of the disturbance and congestion in the prostate gland, rarely fail on the other in extending the inflammatory action from the mucous membrane to the muscular coat of the bladder, a circumstance that usually ends in a consolidation of

the general structure, which in many cases prevents it from ever again recovering its natural power of relaxation.

Sect. 5.

On the Effects produced on the Secretion of Urine.

Where, either from an enlargement of the prostate gland, or from obstruction of any other kind in the urethra, the difficulty in emptying the bladder is considerable, a diminution in the quantity of urine secreted very commonly takes place, so that the patient shall himself observe that he does not perhaps pass half the quantity of water that he used to do in the course of the twenty-four hours. This circumstance, which, from its frequency, must be supposed to be connected with the difficulty the bladder experiences in the expulsion of the urine, has been regarded as arising from the secreted fluid being checked in its free passage by the ureters, in consequence of which a certain degree of pressure being established by the urine accumulated within the cavities of the kidneys, the process of secretion is more or less retarded, and less urine is separated from the blood.

The degree of inconvenience sustained by the kidneys when placed under these circumstances will vary exceedingly in different cases. It will be in some measure regulated by the state of the con-

stitution, but will principally depend on the particular degree of the obstruction, and on the quick or slow increase of the disease by which it is produced. Should the progress of the disease be slow, the increase of the consequent pressure in the cavities of the kidneys may be extremely gradual, and these glands will be sometimes found to adapt themselves in a very remarkable manner to the difficulties of their situation, the whole fabric of the kidney becoming more or less enlarged by distension. But where the rapid progress of the disease brings on an early and complete retention of urine, the resistance from the full bladder preventing the flowing in of more fluid by the ureters, a pressure is induced, the most usual consequence of which is a sudden arrest of secretion, and unless this pressure is quickly removed by the introduction of an instrument into the bladder to draw off the water, the kidneys become incapable of renewing their functions, and the patient sinks into a comatose state, which soon terminates fatally.

Sect. 6.

On Affection of the Prostate Gland connected with Stricture.

In the foregoing observations, those circumstances have been noticed that must occur in every case of affection of the prostate gland, but it does not al-

ways happen that this affection stands alone; it is in many instances connected with strictures in the urethra; and under these circumstances, unless the history of the case is carefully enquired into and attentively considered, the symptoms that belong to each of these two diseases are extremely liable to be confounded together, to the embarrassment of the surgeon and the injury of the patient.

In some instances it appears that the obstructions in the urethra have taken the lead by many years, and that they have in all probability been instrumental in laying the foundation for the subsequent enlargement of the prostate gland; in others, however, the affection of the prostate gland has obviously given rise to contractions in the urethra, and as the importance of distinguishing the primary from the secondary disease is self-evident, it must be equally clear that it is essential to the patient's relief that the practitioner should form a clear and accurate opinion of the case, and be able to determine at once the exact relation which the two complaints bear to each other.

Where strictures in the urethra have subsisted for many years, occasionally connected with considerable spasm, and sometimes with irritation about the neck of the bladder, there may be some difficulty in ascertaining the precise period at which an affection of the prostate gland may have commenced, but the degree of present inconvenience produced

by the stricture, and that which is justly attributable to the affection of the prostate gland, are points that possess much more immediate practical importance, and these may in general be readily enough determined.

Should the prostate gland have been the original seat of the disease, any consequent contraction that may take place in the urethra will most commonly possess the characters of spasmodic stricture, and a little attention to it, in the first effects of the treatment proposed, will soon establish the accuracy of the opinion taken up, while it opens the way to the permanent relief of the complaint.

An examination of the gland by the rectum will very generally assist, and often enable the practitioner at once to make up his mind as to the existence of any affection of the prostate gland, although where the enlargement is inconsiderable there may be some difficulty in ascertaining it satisfactorily; some practitioners it is true, have of late affected to consider this mode of enquiry unnecessary, from an opinion that the exact state of the prostate gland may in all cases be determined with sufficient accuracy by the impression conveyed by an instrument passed into the bladder; this however, I cannot help regarding as one of those refinements in modern surgery, the observance of which is rather injurious than beneficial in the practice of the profession.

An affection of the prostate gland connected with stricture in the urethra is not the only complication that may occur, for it sometimes happens that during the existence of these complaints a disposition will arise in the kidneys to secrete calculous matter. The particular course of the symptoms has in certain cases led to the belief, that the irritation produced either by the affection of the prostate gland or by the obstructions in the urethra, is capable of extending itself very considerably, so as to explain the eventual derangement in the functions of the kidneys.

There can be no doubt that any hindrance to the free evacuation of the urine, whether the obstruction arises from enlargement of the prostate gland, or from stricture in the urethra, will have a strong tendency to prevent the escape of small calculi, and also favor the precipitation of mucous, sabulous, and calculous matter from the urine in the bladder, circumstances which have more or less influence in forwarding the production of stone in the bladder, and aggravating materially the symptoms incident to the other complaints with which it may be connected.

We have, unfortunately, no mode of determining with precision the exact degree of injury that may have been sustained by the prostate gland when it has once become the seat of enlargement. The progress or decline of the affection depends from

time to time upon that of the other complaints with which it may happen to be connected; should the case be that of irritable bladder with enlarged prostate gland, the means that succeed in relieving the irritation will be almost sure to alleviate the uneasiness and other symptoms produced by the affection of the gland, or on the other hand, should the original disease have been stricture in the urethra, the opening the passage from the bladder, by the means best adapted to the particular circumstances of the case, will scarcely ever fail in tranquillizing very much the disturbed state of the prostate gland.

Sect. 7.

On the advanced Stages of Disease in the Prostate Gland.

It has been already explained that an enlargement of the prostate gland, when it reaches a certain stage of its progress, becomes almost necessarily a complicated disease; and the further it advances into this state, the more difficult it will be to determine accurately upon the degree of change that may have taken place in the structure of the gland.

We learn by dissection of the parts after death, that the prostate gland has occasionally been the seat of abscess; and that the kind of suppura-

tion which takes place, appears to depend on the state of the constitution on the one hand, and on the degree to which the irritability of the parts have been previously exhausted on the other. But although I have had opportunities of watching the progress of many such cases at the bedside, in very few of them has it ever been possible to distinguish with accuracy by the course of the symptoms, at what particular period either the suppuration or its preceding inflammation took place.

When the prostate gland has suppurated the contents of the abscess may, by exciting inflammation, adhesion, and ulceration towards the posterior part of the gland, make their way into the rectum, so as to be evacuated by the anus; or the abscess may burst into the urethra or bladder, in either of which cases also the pus readily escapes; or lastly it may break into any part of the cellular membrane surrounding the gland, when inflammation will come upon some part of the perineum, and the abscess in this way will burst externally, leaving a fistulous disease more or less distressing, according to circumstances.

The diseased prostate gland has in some cases thrown up an irritable fungous growth, protruding into the cavity of the bladder, and very much disposed to bleed on the slightest disturbance; and where under circumstances of advanced disease in this part, a great and excruciating degree of irri-

tation comes on about the bladder, an irritation infinitely more severe than any former attack, which almost prevents the introduction of any instrument being endured, and is attended with frequent evacuation of dark coloured blood with the urine, there will be some ground to apprehend that the disease is taking this particular turn.

Small calculous concretions are occasionally met with in the cavities of the abscess, in diseased prostate gland. In some instances it has appeared probable that these calculi have been dropped accidentally into this situation in their way out from the bladder, but in others, the peculiar porcellaneous polish which renders them very similar in appearance to small pearls would argue a difference in composition between these and the more common kinds of urinary calculi.

CHAPTER VI.

ON THE TREATMENT OF DISEASE IN THE PROSTATE GLAND.

SECT. 1.

Of the Treatment required in the early Stages of the Disease.

WHERE an enlargement of the prostate gland takes place, while the patient is labouring under strictures in the urethra, the affection need excite no particular uneasiness, the tumor is formed by the lateral parts and not the middle lobe of the gland, it is the consequence of disturbance rather than of disease, and by the treatment adopted for the removal of the strictures the affection of the gland also will be relieved.

The affection of the prostate gland, that occasionally occurs in gonorrhæa, is of so transitory a nature as relates to the state of the gland that it scarcely requires mentioning. The whole of the importance of the case, and the severity of the irritation, rests upon the mucous membrane at the neck of the bladder, which is thrown into a state of

violent excitement, and is frequently productive of the most extreme distress. But the great increase in the quantity of secreted matter thrown off from the irritable membrane must have an evident tendency to prevent rather than promote the establishment of any permanent affection of the prostate gland.

The treatment should be that which is most likely to restore the irritation to its proper seat at the anterior extremity of the urethra, and for this purpose the means already pointed out must be had recourse to *; added to which, the parts may in some cases be still farther relieved by the abstraction of blood locally, and with this view some leeches may be applied to the perinæum, or the patient may be cupped upon the loins.

Where however a degree of frequency and uneasiness in passing the water makes its appearance for the first time towards the decline of life, there will be good reason to suspect some affection of the prostate gland, for if the patient has never before been subject to stricture in the urethra this is not the period at which that disease takes place.

During the early progress of the complaint it is generally capable of being very much relieved, and frequently altogether removed, provided it then receives all the attention it deserves.

* See page 108.

The patient should be immediately requested to remain entirely at home, and to keep quiet. He should lose a little blood, either from the loins or perinæum; his bowels should be kept gently relaxed, he should take neither wine nor spirits, but observe a mild, cooling, and temperate diet, the above treatment being assisted by the occasional use of the hip bath, and the exhibition of an opiate at night. On no account, in this stage of the disease, should either bougie or catheter be passed, the experiment can do no good, and its only tendency will be to increase the disturbance and irritation of the parts.

The most usual course of the symptoms is that just described, but I have seen several instances, and one will be related *, in which the first intimation of any thing being wrong was a total stoppage in the passage of the urine, which complete retention continued for several days, until at length fortunately an instrument was so passed as to get beyond the obstruction, and draw off the urine.

Sect. 2.

On the Introduction of the Catheter.

When the difficulty in passing the water becomes considerable, so as to be attended with much uneasiness and straining, it will be necessary to relieve the parts from the disturbance excited

* See Case 16.

by the natural efforts to empty the bladder; and this is to be done by the introduction of a proper instrument at regular intervals, so as to allow the water to pass off without any exertion whatever on the part of the patient.

The catheter of silver should never be introduced, unless it has been ascertained that the flexible gum catheter will not pass. Wherever the latter instrument is capable of answering the purpose it is to be invariably preferred, and it should be gently and slowly passed forward, in order that the sensible and perhaps irritable membrane of the urethra may be as little disturbed as possible.

It has been supposed that the elastic gum catheter will acquire a great superiority by having been retained in a certain degree of curvature for a long time previous to being used, but considering how readily this instrument acquires warmth in its passage through the urethra, and how readily it may be made to follow the course of the canal without having been previously set, I confess myself not inclined to ascribe any material importance to this circumstance.

Should it be impracticable to introduce the flexible catheter alone, it may sometimes be so directed as to pass over the obstruction by being introduced upon a stilet, which has some degree of firmness, and a considerable degree of curvature up to the point.

In the operation of introducing a catheter it will generally happen that success is rather attributable to attentive perseverance than to the application of any considerable degree of force, which should always be avoided. The making too much pressure with the instrument will almost always excite unnecessary irritation, it may do considerable mischief, but will scarcely ever forward the accomplishment of the object in view.

In some instances however, the flexible catheter cannot by any means be made to pass into the bladder. Under these circumstances, should the retention of urine be complete, we must endeavour to introduce the silver catheter, and by varying the direction of the point, together with the degree of pressure applied, it will in general overcome the resistance and pass into the bladder.

Should the attempt to introduce the silver catheter have succeeded, but with considerable difficulty, the instrument had better be allowed to remain some short time in the bladder, with a view to the leaving an impression of its figure upon the sides of the tumor, which will materially facilitate the subsequent introduction of a flexible gum catheter of the same size, which being previously laid ready, should be passed into the bladder immediately the silver catheter is withdrawn.

In those instances where the introduction of the flexible catheter has been effected with difficulty, it will be necessary that it be allowed to remain in the bladder for a certain number of days, for the purpose of ensuring the bladder being relieved at regular and stated intervals, either twice or thrice in the course of the twenty-four hours. In this case, the end of the instrument that projects externally must be carefully secured to a T bandage passed round the waist, so as to prevent the possibility of its escaping entirely into the bladder, an accident that might involve very serious consequences.

When an affection of the prostate gland is in that stage of its progress as to require the introduction of a catheter, the instrument should always be selected of as large a size as the circumstances of the case will admit. The rounded extremity of a full sized catheter presents a comparatively broad surface to any little obstruction that may occur, upon which account it is to be preferred, being infinitely less liable to take a wrong direction than a smaller sized instrument would be.

Sect. 3.

On the Production of False Passages.

Where a bougie or catheter has been frequently passed without due attention being paid to the natural course of the canal of the urethra, and parti-

cularly where the operation has been performed by the patient himself, it has been frequently found after death that the point of the instrument, losing the true line of direction at the curve of the urethra, has pressed for some time obliquely against the side of the canal, in this way producing a degree of depression, while the inner membrane of the urethra pushed before the point of the instrument, has been by this means formed into a transverse ridge. Where this consequence has taken place to a greater extent, that which was at first only a slight depression becomes a cavity, and this cavity in the course of time will form a tube, which according to the circumstances of the case may lead out from the posterior part of the urethra towards the rectum, or pass backward in a line parallel to the course of the natural canal, the inner membrane only being interposed between it and the urethra; or should the accident have taken place in the prostatal part of the urethra, the false passage may take its course through some part of the substance of the prostate gland into the bladder, or it may, as in the other part of the urethra, form a passage parallel to the proper line of the natural canal, so that when the instrument is introduced it will pass along between the substance of the prostate gland and the membrane covering it, subsequently making its way out again into the cavity of the bladder.

I was lately requested to examine the body of a

physician who for many years was one of the most approved teachers in London in his particular department of medical science. He had been for many years subject to strictures in the urethra, and had been long in the habit of passing bougies for himself. In consequence of this practice he had formed two false passages; one of these was anterior to the verumontanum, and passed obliquely out from the urethra for the extent of 1-4th of an inch, forming a cul de sac; the other was situated higher up, passing between the substance of the prostate gland and the inner membrane lining the canal, to the extent of 5-8ths of an inch, where it again opened into the cavity of the bladder. *

In those instances in which the urgency of the case has required an immediate evacuation of the contents of the bladder, while the degree of enlargement of the prostate gland has been so considerable as to prevent the possibility of getting the silver catheter introduced by gentle means, it has sometimes been considered expedient to endeavour to overcome the obstruction by force. Upon this principle the substance of the enlarged gland has in some few cases been made to give way, the instrument has got into the bladder, and a practicable passage has remained for the future introduction of the catheter, without the patient appearing to suffer

* See PLATE 3. *Fig.* 4.

any ill consequence from the violence thus committed upon the parts. I know of one instance, however, in which a very excellent anatomist, who is since dead, in performing this operation, at the earnest entreaty of the patient, unfortunately passed the catheter through the body of a very vascular and irritable fungus that had sprung up internally from the surface of the diseased gland. The patient was instantly thrown into the most excruciating agony, and survived only half an hour. But this was one of those accidents which it was impossible to be provided against; and supposing for a moment that the surgeon could have been previously acquainted with the exact state of the disease, the puncturing the bladder from the rectum, or in any other way, could only have lengthened out a wretched existence for a few days, or perhaps weeks.

In another instance *, where the catheter was pushed through the substance of a diseased prostate gland, hæmorrhage took place, and the blood forming a large coagulum in the cavity of the bladder, prevented the urine from passing off when the catheter was introduced, in consequence of which the patient died.

Should either the enlargement or the excitement of the prostate gland be considerable, the quantity of its secretion may be so much increased as to create

* Mentioned by the late Mr. Hunter.

in some instances even a degree of impediment to the flow of urine, whenever the patient attempts to empty his bladder. If, under these circumstances the urine is received into a glass tumbler, the secretion from the prostate gland forms a transparent, colourless deposit at the bottom of the vessel, and when stirred up will be found as ropy and tenacious as the white of an egg. This mucous matter will frequently be found in the proportion of one sixth part of the whole quantity of urine. The increase in the quantity of secretion from the gland, however, implies no specific state of disease, but it merits attention because it serves to identify the particular seat of the affection.

Sect. 4.

On the Frequency with which the Catheter should be introduced.

It has been already pointed out that when the enlargement of the prostate gland has gone so far as to produce considerable difficulty in expelling the urine, it is very apt to derange the functions of the kidneys, and bring on a diminution in the quantity of urine secreted. This fact is of great importance, and being clearly understood, it serves to confirm the necessity for the bladder being regularly attended to, that it may be emptied at proper intervals, longer or shorter, according to the circumstances of the

case; this being the only means at present known, by which the activity of the circulation through the kidneys may be restored.

The length of the interval which may with propriety be allowed to pass between the periods at which the patient's water is drawn off, will depend very principally upon the state of the bladder.

In those cases where the bladder has never before been subject to disease, possessing its natural power of relaxation, the introduction of the catheter will not usually be necessary oftener than twice a day. Where, however, on the contrary, the history and symptoms of the disease shew that the bladder has in time past been affected with extreme irritation, and perhaps inflammation, and that the patient ever since that period has been in the habit of passing his water at short intervals, the additional difficulty produced by the affection of the prostate gland will require the catheter to be passed with a frequency conformable as nearly as may be, to the acquired habit of action in the bladder, probably every six or four hours, or still more often. Under these circumstances there will be every reason to believe the bladder has suffered more or less of permanent contraction, the degree of which contraction may be in general pretty accurately estimated by the quantity of urine usually passed at a time, previous to the commencement of the more recent affection of the prostate gland.

SECT. 5.

On the Treatment of Enlarged Prostate Gland connected with Stricture.

SHOULD the disease prove to be an affection of the prostate gland, connected with stricture in the urethra, the treatment must be modified, according to the particular symptoms and circumstances of the case.

Where a permanent stricture exists, the first object must be the gradual dilatation of the contracted part of the urethra, by carefully passing a bougie, so as just to pass the strictured part of the canal, where it may be allowed to remain for a very short time, perhaps a minute or two, daily; and as soon as ever the stricture is sufficiently relaxed to admit of it, a small-sized, flexible gum catheter should be gently introduced, and passed on into the bladder to ascertain the state of the prostate gland, as well as that of the bladder itself; and from this time the operation of passing the catheter ought to be repeated at regular intervals, should it be found that the patient has not the power of completely expelling his urine.

When the introduction of the flexible catheter has been once effected, the repetition of the operation, if it is found necessary, forms the most proper, because the most gentle mode of treat-

ment for the stricture, provided the size of the catheter is increased as quickly as the state of the parts will admit.

It frequently happens, that in cases where a considerable degree of permanent contraction in the urethra has long existed, when the disease becomes subsequently connected with an affection of the prostate gland, the irritation arising from the state of the gland, aggravated by the difficulty experienced in passing the water, induces a degree of spasmodic action in the strictured part of the urethra, and the most effectual mode of relieving this spasm will be to relieve the bladder, upon which it depends; and this is to be done by watching the earliest moment for passing the flexible gum catheter, and drawing off the water regularly.

The above treatment will often require to be combined with some of those means recommended above, for the relief of affection of the prostate gland, particularly in the exhibition of opiates; and much the best preparation of this kind that I know of is the compound powder of ipecacuanha.

The contraction in the urethra, which is more immediately the consequence of affection of the prostate gland, appears to be clearly a spasmodic action of the muscular fibres of the urethra, for it is relieved by the means known to remove spasm, and by these only, such as the warm bath, rest, the administration of opiates, and the relieving the

bladder at regular intervals by the use of the elastic catheter, all which means are calculated to allay the disturbed state of the gland, and more especially the irritable state of the bladder connected with it.

Where unfortunately, the complaint at present under consideration, appears to have been the means of exciting a disposition in the kidneys to secrete calculous matter, it gives an unfavourable turn to the case, inasmuch as it produces an additional complication, and adds greatly to the suffering of the patient. The small fragments of gravel increase the irritation at the neck of the bladder, and as often as these are brought by the stream of urine into the urethra, they are very apt to collect behind the stricture, particularly if the canal at that part is much contracted. When this happens, the irritation and pain become excessive, and the patient, anxious and alarmed, is every hour in apprehension that it will be no longer possible either to get rid of his urine unassisted, or to make an instrument pass this collection of little calculi, for the purpose of drawing it off.

The principles of the treatment, however, in such a case as this, must be the same that have been above detailed, as proper for the relief of calculous complaints, although the extremely irritable state of the urinary organs, under the combined influence of these diseases, will very often

prevent the continued use of those remedies, which in a more healthy condition of the parts, would presently succeed in correcting the action of the kidneys, without inducing any inconvenience.

As to the treatment of the more advanced stages of disease in the prostate gland, where this part has become the seat of abscess, and the escape of the matter has produced some of those consequences already adverted to, in the history of the disease, the most assiduous attention should be paid to all those circumstances by which the feelings of the patient may be soothed, and his sufferings alleviated. Should there be reason to believe that an abscess either is forming, or perhaps has already taken place, fomentations may be had recourse to with advantage, and whenever the symptoms of irritation prevail, they must be principally attended to, and as much as possible alleviated by the administration of opiates, and other antispasmodic remedies; unhappily, however, when the disease has reached this point the efforts of art generally prove unavailing, and the patient is eventually exhausted by the combined effects of long continued discharge, frequent irritation, and constant pain.

Case 16.

Enlargement of the Prostate Gland.

A. B, a healthy seafaring man, 58 years of age, left Sunderland about noon, on Wednesday, August 2d.

1808. At this time he passed his water very well. Two hours afterward, when he again attempted to make water, he was unable to pass a drop; and he remained in this state till on the next morning his vessel reached Scarborough.

The moment the anchor was in the ground, he came ashore, and sent for his surgeon, who endeavoured to introduce an instrument, but failed. He tried the silver, as well as the flexible gum catheter, and bougies of various kinds, but all to no purpose.

On the evening of August the 5th, I first visited him. The bladder was evidently very full, and was extremely painful. He had lost eight ounces of blood, he had taken opiates repeatedly, had been several times immersed in the warm bath, and the lower part of the abdomen had been repeatedly rubbed with camphorated and oily embrocations. It was stated that there was an obstinate stricture that could not be passed, and that it was proposed to puncture the bladder.

On the morning of Saturday he had passed a little water, which had dropped away for some time pretty quickly, but soon ceased again. He was in extreme pain, from the distended state of the bladder, which formed a very obvious tumor above the pubes; and his skin was covered with a copious perspiration.

It was determined in consultation to make one more attempt to pass an instrument, previous to puncturing the bladder. One of the surgeons present endeavoured to introduce the silver catheter, but failed; another gentleman made the attempt, but with no better success, when the instrument was put into my hands. The catheter was of a middling size. It passed so freely along the urethra to the prostate gland, that it appeared to me stricture could have nothing to do with the obstruction. With this impression, the direction of the point of the instrument was occasionally varied, keeping it as close behind the arch of the pubes as possible. In this way I soon succeeded, the point of the catheter in a few minutes was felt to slip over an elastic projecting point of the tumour, and passed at once into the bladder. Seven pints and a half, by measure, of high coloured and offensive urine were drawn off, to the infinite relief and comfort of the patient.

The same evening the surgeon in attendance endeavoured again to introduce the catheter, but did not succeed. The next morning he sent me word that he was going out of town, requesting me to pass the instrument for him. Subsequently, the patient entreated me to pass the catheter for him regularly. Upon making an examination by the rectum, the prostate gland was found to

be considerably enlarged, and more firm than natural.

After the first ten days, the silver catheter was exchanged for the flexible gum catheter, passed upon an iron stilet. In the beginning of September his health was fast improving, and as he was very anxious to be enabled to go to sea again, he was taught to introduce the catheter for himself. This at length he succeeded in accomplishing, although at first rather awkwardly. Towards the middle of the month the water began again to flow off, by the natural efforts, at first seldom, and in small quantities; but as he continued to improve, the natural powers became perfectly restored, so that from the 27th of the month the catheter was laid aside entirely, being no longer wanted.

Case 17.

Diseased Prostate Gland.

A gentleman, about 50 years of age, had been long subject to an enlargement of the prostate gland. The inconveniences however to which this at first gave rise were only occasional, as it was not often that the introduction of the catheter was required. But as the complaint increased, the necessity for frequently using the catheter increased, while the difficulty with which it was passed increased also.

The affection of the prostate gland continuing to get worse, his general health began to give way. He lost all power of expelling the urine, and was confined, first to his room, and then to his bed. The catheter was now passed regularly.

While lying in this state, he one day found considerable uneasiness and pain coming on in the lower part of the abdomen. This pain quickly increased to the most intolerable degree of severity, producing screams, groans, and delirium. These symptoms, in spite of every means proper for the relief of inflammation, became speedily worse and worse. Upon introducing the catheter as usual, the bladder was now for the first time found empty, or nearly so.

The severity of the attack continued to increase for 24 hours, when drowsiness and coma supervened, which in twelve hours more terminated his existence. I was desired to examine his body.

Examination.

Externally the body was considerably loaded with fat. On laying open the cavity of the abdomen, a considerable effusion of purulent matter and coagulable lymph, was found among the small intestines, and about the cavity of the pelvis. This appearance was principally confined to the neighbourhood of the urinary bladder.

On the peritoneal covering of the bladder were some shreds of adherent coagulable lymph; by seve-

ral of these it was connected to the peritoneum above the pubes. The bladder felt thickened, and on pressing it, a jet of urinous fluid sprung out from a particular part of its surface. On examining this part carefully with a probe, a small hole was found, through which the instrument passed at once into the cavity of the bladder.

By cutting upon the probe, this opening was enlarged, so as to lay open the whole cavity of the bladder.

It appeared from the examination, that the immediate cause of death had been the inflammation of the peritoneum, caused by the escape of the urine into the abdomen, through a small ulcer in the coats of the bladder. Several small partially ulcerated spots were found upon the inner membrane of the bladder, although it was only at one point that the ulceration had reached to the peritoneal covering, through which the urine had burst into the general cavity.

The prostate gland was very much enlarged, and had a considerable abscess formed within its substance. This abscess had extended itself by forming sinuses for some extent beyond the surface of the gland, passing between the diseased and thickened coats of the bladder.

The diseased state of the prostate gland had in this case most probably operated by its irritation, so as to produce that affection of the mucous mem-

brane of the bladder which had eventually become the immediate cause of death.

Several duplicatures of the membrane lining the prostatal part of the urethra were observed. The deepest of these depressions was found to extend for about 1-8th of an inch out of the course of the natural canal; an extent quite sufficient to have given a complete false passage, had any instrument been pushed forward in that direction with a force sufficient to have ruptured the membrane. These folds were all situated upon the posterior surface of the urethra, and might have been avoided by an instrument having sufficient firmness and curvature to allow of its being kept in contact with the superior part of the urethra all the way to the bladder.

Case 18.

Diseased Prostate Gland and Bladder.

Thomas Fulker, a labouring man, 35 years of age, was admitted into the St. George's infirmary in February 1815. The following was the history that he gave of his complaint.

In the year 1800, he had been frequently employed in carrying very heavy loads, which he supposed were too great for his strength, for he found himself about that period becoming weak in the back and loins, added to which he partially lost

the power of retaining his urine, and this weakness had remained upon him more or less, ever since. In degree however it was variable, at some times he was obliged to pass his water every half hour, at others he was enabled to retain it for three or four hours. For several years this complaint was very troublesome, although never at all painful, as it only subjected him to be occasionally wet in his linen.

In 1806, he said he was so ill, as to be confined for many weeks to his bed, with what he first called a fever, although on cross-examination, it turned out to be a venereal chancre with gonorrhæa; for the one complaint he had applied the mercurial frictions, for the other injections. The true nature of his disease, however he had wished to conceal, from an idea that if it was known, he would not be allowed to remain in the house. The injections had very much increased the frequency, as well as the pain and difficulty in passing his water, and these complaints remained upon him for many months afterwards, although in other respects his health was in due time restored, and he was for several years constantly able to work.

In the year 1810 an abscess formed in the perinæum. He had been engaged in a job of work as a plasterer, as far from town as Harrow, a distance of ten miles, which he walked every day. He thought this was the cause of the inflammation that took place

in perinæo, with which he was in a few days obliged to keep his bed. The tumour was poulticed and fomented, and in the course of a week gathered, and broke, when he became easier. He said he had always been able with some difficulty to get rid of his water, but a surgeon then attending was not able to pass a very small bougie into the bladder, on account of stricture.

In about a month the abscess healed, and he was able to go to work again. He now remained well for eight months, when he had the misfortune to fall from a scaffold while repairing the cieling of a room. He did not strike or materially bruise himself any where in falling, that he knew of, but immediately afterward found that his urine was oozing out from the cicatrix of the former abscess in the perinæum. From this time the urine generally passed as freely by the wound as by the urethra. This accident appeared to have occurred without preceding suppuration, at least he had not felt any pain, or observed his linen soiled by discharge previous to his fall. His general health was still tolerably good.

From this period he remained much the same till January 1815, when a renewed attack of inflammation, attended with extreme pain, and considerable swelling, commenced in the perinæum. During the violence of the inflammation, which continued on this occasion for nearly a month, the urine continued

to pass principally by the perinæum. The abscess then broke, and a very large discharge of offensive matter came away by the old wound, through which the urine also was evacuated. By this event he felt some relief, although still harassed by constant and distressing pain.

The fistulous opening in perinæo was not far from the anus; and poured out a very large quantity of unhealthy discharge. When examined by a probe it was found to lead forward, in various directions, towards the scrotum and bones of the pelvis.

During the month of March his health and strength were obviously on the decline, from the quantity of fœtid discharge secreted by the sinuses about the perinæum. His bowels were occasionally disordered, being sometimes confined, but more frequently too much relaxed.

In the beginning of April, as the proportion of urine passed by the urethra was still diminishing, another attempt was made to pass a bougie, but although one of the smallest size was selected, it could not by any means be made to pass further than half an inch into the canal. He had been before advised to allow proper measures to be adopted for the removal of the obstructions in the urethra, and the same advice was now repeated, but to no purpose, as he could not be prevailed upon to allow any thing to be attempted for his relief.

Towards the latter part of the month he had repeated attacks of diarrhœa, with constant tenesmus, great pain, and frequent watery motions, which were apparently urinous. His appetite had now failed him so completely that he could eat nothing whatever. Under this accumulation of distress he continued to struggle till the 9th of May, when he died.

Examination.

Externally there were several large excoriated fistulous openings in perinæo. A part of the diseased integuments of the perinæum, with the bladder and its appendages, were carefully removed from the body, to admit of a more accurate examination.

The bladder was contracted, and in its muscular structure more firm than natural. The whole of the cellular membrane, beneath the integuments of the perinæum, was loaded with effused lymph, which had by time become converted into a thickened mass of disease, firm as gizzard, and full of sinuous passages, burrowing in every direction.

Upon laying open the urethra, the external stricture which had prevented the bougie from passing was found to be very considerably relaxed; but from the point where this commenced to the extent of two inches and a half from the external orifice, the diameter of the canal was much diminished. The urethra at this part had evidently suffered much

from inflammation, and a considerable effusion of coagulable lymph having taken place into the cells of the corpus spongiosum, had given a degree of permanent firmness to the contraction of the inner membrane.

The inflamed part of the mucous membrane of the urethra was not only contracted, but was much thickened, and more firm in its texture than natural, retaining also, in some degree, the high colour and increased vascularity belonging to inflammation, while that part of the canal immediately beyond it, towards the bladder, still possessed its healthy appearance.

At the bulb of the urethra was a firm stricture, so closely contracted that even in the relaxation of dead parts it was hardly possible to pass a silver probe, no larger than a bristle, through it. This close contraction, however, was found to have taken place only to the extent of 1-6th of an inch.

Finding the rectum closely adherent to the bladder, I had dissected out a part of that intestine with the disease, to avoid any chance of injuring the prostate gland. The inner membrane of the gut was of a very unhealthy colour, and where it was connected with the prostate gland had somewhat of a fungous appearance. On a more particular examination of this part an opening was found, passing from the cavity of the intestine into that of

a large abscess within the substance of the prostate gland.

The bladder, on its posterior part, was then laid open, by a longitudinal section. By this means a small abscess was accidentally discovered, full of thick purulent matter; it was situated between the peritoneal and muscular coats, at the fundus of the bladder.

The coats of the bladder were extremely thickened, its cavity very much diminished, and its inner membrane of a lurid colour, and highly vascular.

The abscess in the prostate gland contained a thick brownish yellow matter. Some parts of this abscess had assumed a fungated appearance, while in others the parietes had formed little recesses, in which were lodged a considerable number of small rounded calculi. Some of these calculi were of a dark brown colour, but others, when allowed to dry, assumed the colour and polished appearance of small pearls.

Between the stricture at the bulb, and the neck of the bladder, several fistulous openings were found, leading out from the urethra; some of these canals being connected with the abscess in the prostate gland and consequently with the opening into the rectum, and others communicating with the fistulous passages in perinæo. *

* See the Diseased Parts. PLATE 4.

CHAPTER VII.

ON THE SYMPTOMS, CAUSES, AND APPEARANCES OF DISEASE IN THE URETHRA.

SECT. 1.

On the Structure and Functions of the Urethra.

THE urethra is that canal which opens from the urinary bladder externally, at the extremity of the penis.

By dissection we learn that the urethra is made up of several different structures, all of which agree in possessing a certain degree of elasticity. It has been already observed, that the inner membrane of the urethra is continuous with that which lines the cavity of the bladder, and that it forms an extensive secreting surface.

The canal of the urethra is surrounded by a cellular or spongy structure for the greater part of its extent, which cellular structure becomes turgid with blood, together with the cavernous bodies of the penis, when the parts are under the influence of the venereal excitement.

External to its spongy structure the urethra receives a partial support from certain muscles of

considerable power, which are subservient to the purposes of generation; as well as from several ligamentous expansions by which it is more immediately connected to the symphysis pubis.

Upon laying open the cavity of the urethra we see that its internal appearance varies, conformably to the particular office assigned to each part of the canal. At the neck of the bladder it is of a pale yellow colour, and it has much the same appearance where it passes through the prostate gland, and receives the seminal ducts. Just beyond this, at the membranous part, the canal becomes smaller, and from being more freely supplied with red blood, it assumes a dark red colour. Immediately before the membranous part, the canal, for the space of two inches, becomes much more relaxed and capacious, and the inner membrane still more vascular, forming what has been termed the bulb of the urethra. Anterior to the bulb the diameter and vascularity of the canal are again reduced, so that the colour of the inner membrane appears comparatively pale.

These appearances in the healthy urethra correspond exactly to the functions allotted to the different parts of the canal. We know that, as a general rule, the sensibility and irritability of parts bear a certain proportion to the vascularity; and upon this principle there would be no difficulty in determining, from the appearance of the parts, that the most irritable points in the urethra must be bulbous and

membranous portions of the canal, and that the only part sparingly furnished with irritability, and therefore not provided for occasional excitement and action, is that portion of the urethra which passes through the prostate gland.

Upon the internal surface of the urethra numerous small openings may be observed, and into each of these minute openings a common bristle may be passed obliquely backward for about 1-8th of an inch. These are the orifices of the lacunæ of the urethra. They furnish a certain proportion of the mucous matter by which the surface of the urethra is kept continually moistened, they exhibit one of the simplest forms of glandular structure with which we are acquainted, and, like other glandular parts, they are liable to inflammation; in which case they are subject to enlargement, may secrete purulent matter, or may become the seat of abscess.

The most complicated function of the urethra is that which it performs in concert with the parts immediately surrounding it in the expulsion of the semen; during the excitement that immediately precedes the act the seminal fluid is accumulated in the bulbous part of the urethra, preparatory to emission, and upon the spasm taking place, the membranous part that leads backward into the bladder is so closely contracted as to be completely shut up, while the bulbous part of the canal, together with the stronger muscles surrounding it, con-

tracting with force, the contents of the urethra are driven forward with considerable impetus, the action of the muscular fibres of the canal coming forward with its contents, even to the orifice of the urethra. *

These are the appearances and actions of health; but it is under circumstances of indisposition that the strongest evidence is afforded of the membrane of the urethra possessing a muscular power. Indeed, the fact may be proved almost in any instance, by introducing a bougie of moderate size into the healthy urethra, and lightly supporting the

* The infinite variety that may be observed in the resources of nature is well calculated to excite our highest admiration. The spasm by which the membranous part of the urethra is closed up, in the venereal act, is obviously appointed to prevent the dispersion of the seminal fluid; the same end is obtained by a more ingenious and a more simple contrivance in some of the lower orders of the mammalia. In the male porpoise, for example, which I some time since dissected, the bladder communicates freely with the urethra, but the seminal ducts open upon the point of a soft spongy vascular papilla, that projects forward into the urethra, as the os uteri does into the vagina. Over the surface of this papilla, while in its flaccid state, a probe may readily be passed through the semilunar opening into the bladder; but just at this part the urethra is found to be encircled with a strong thread of ligamentous fibres, so that when, preparatory to the coitus, the parts are rendered turgid with blood, this vascular body swelling up, becomes so tightly girt by the ligamentous circle round its neck, as to effectually close up the passage into the bladder, and prevent the possibility of the dispersion of the fluid contents of the urethra.

end that projects from the penis, in a horizontal position. If the action of the urethra is then watched with attention, it will be found that the power which expels the instrument, in other words the contraction of the urethra, is uniform through its whole extent. The point of the bougie is not pushed forward more quickly while it moves through the bulb of the urethra, where the canal is surrounded with strong muscles, than it is afterward, but on the contrary, its motion is exceeding slow and perfectly equal throughout, until the whole of the instrument is expelled, and the point fairly drops from the orifice of the urethra. Late authors may say this is clearly the elasticity of the living membrane, and perhaps had the bougie been passed only to the extent of half an inch into the urethra, its expulsion upon this principle might admit of doubt; but when the instrument has been introduced several inches, the advocates for elasticity forget that while the membrane of the urethra is exerting itself, for one-eighth of an inch to push forward the end of the bougie, the same power is operating against it to the superior extent of several inches, and that the considerable friction from so extensive a surface of contact must prevent the possibility of elasticity having any thing to do in the expulsion of the instrument.

It has been distinctly explained by one of the

highest authorities in the profession *, that the urethra is not only muscular, but that its canal, like all other muscular tubes in the body, is in particular cases susceptible of partial contraction, or spasm, and that this spasm constitutes one kind of stricture in the urethra; and really, the evidence which every day's experience affords upon this point is so clear, that even supposing the mind to be raised superior to any regard for the successful labours of others, it still seems unaccountable that any person should feel disposed to affirm that the urethra has no muscular power, and consequently, that spasm has nothing to do in its diseases; more especially as comparative anatomy demonstrably proves that in the larger animals, particularly in the horse, where structure is more readily developed, and where the functions of the urethra are precisely the same in every respect as in the human subject, the strong muscular fibres encircling the urethra cannot be overlooked.

Sect. 2.

Of the Nature of Spasmodic Stricture.

As the urethra is a membranous canal, surrounded externally by a series of muscular fibres, its being occasionally subject to an excessive degree

* Mr. J. Hunter.

of contraction in any particular part, is only a quality which it possesses in common with all other muscular structures placed in similar circumstances.

Where, from any cause, the contraction of the muscular fibres of the urethra is partial, and to a certain extent permanent, it produces a hindrance to the free stream of urine, excites attention, and in this state is termed a spasmodic stricture.

The affection, in this stage of its progress, is very properly considered to be of a spasmodic nature, as the term refers merely to an excessive action of muscular fibres, and not to any change in the organization of the parts. There are also many proofs that this opinion of stricture is well founded. In the first place, the causes by which the contraction in the urethra may be brought on, are those that are known to be capable of producing irritation in any other muscular parts; secondly, the sudden manner in which, in certain cases, the effect follows the cause, affords a strong argument that the stricture must be pure spasm; and lastly it is proved by the immediate relief afforded by certain medicines, which it is well known can operate only by alleviating spasmodic action.

This species of contraction has been * described as generally affecting only a very small extent of

* By Mr. Hunter.

the canal, producing an appearance in the urethra as if it had been surrounded by a packthread.

Sect. 3.

Of the Circumstances which favour the Conversion of Spasmodic, into Permanent Stricture.

While the stricture remains in this state, it is liable to occasional contraction or relaxation, from the influence of apparently trifling accidental circumstances. It necessarily becomes the most irritable part of the canal, and any change in diet, excess in wine, exercise, or fatigue, may be sufficient to aggravate the degree of spasm, excite inflammation, and even bring on a complete retention of urine; and the usual consequence of such accident is, that the stricture, which was at first merely a spasmodic affection, becomes converted by degrees into a permanent contraction of the part, from the change in structure incident to repeated inflammation.

Sect. 4.

On the Irritations that occasionally operate as Causes of Stricture.

As stricture in the urethra is almost always in the first instance the consequence of some irritation, it is natural to infer that the nature and tendency

of the contraction will be dependant on the circumstances under which the irritation has been applied. Where the stricture has been brought on by sympathy with some of the surrounding parts, as in disease of the rectum, bladder, or prostate gland, the affection will be at first purely spasmodic, and will be very likely to remain so; but where, on the other hand, an irritating cause of considerable power has been at once brought into immediate contact with the inner membrane of the urethra, as is the case where astringent injections are used in gonorrhœa, or when a calculus is arrested in its passage through the urethra exciting extreme pain and violent inflammation, it generally happens that an effusion of coagulable lymph takes place into the surrounding cellular texture, thus laying the foundation for the most obstinate, and extensive, kind of stricture.

The irritation of stone in the bladder generally operates in the course of time as an exciting cause of stricture in the urethra; and where the contraction is obviously of a spasmodic nature, and is readily overcome, so as to admit of the calculus being distinctly felt in the bladder, the affection in the urethra may very safely be considered as the accidental consequence of the irritable state of the parts.

It has long been a contested point in surgery, whether injections thrown into the urethra, have

the power of producing stricture. In the majority of cases, it is certainly not possible to prove that they have done so, but in several very strongly marked instances I have known them, through the medium of inflammation, not only leave stricture, but stricture of the worst and most obstinate kind that could possibly be, which never afterwards was removed, and scarcely admitted of any material relief.

In these instances however, the seat of the affection having been the anterior or external part of the canal, and this not being the most usual situation of stricture originating in spasm, it might still admit of a doubt whether the irritation from an injection applied to the one extremity of the urethra, is capable of producing a spasmodic stricture at the other. As far as my experience has enabled me to judge, I am clearly of opinion that it does happen, and that stricture is in many instances derived from this cause alone. In one case particularly, the patient who had a gonorrhœa, had been directed to use an injection, which was of so moderate a degree of strength, that it did not materially lessen the quantity of discharge, and of course was not the means of exciting any more violent inflammation, but it nevertheless brought on a retention of urine, for which I was consulted, and on introducing a bougie it was found that a spasmodic contraction had taken place in the most usual seat of stricture, the membranous

part of the urethra. The affection however, was readily relieved, by the warm bath and opiates.

In this case we see that an irritation comparatively slight was answered by a correspondent degree of temporary contraction at the part sympathizing with the original seat of the impression. But in several other instances, and in two particularly that will be again adverted to *, the use of astringent injections that were sufficiently powerful to excite violent inflammation in the anterior part of the urethra, were also productive of permanent stricture at the membranous part of the canal, in connection with irritable bladder.

Any external violence may operate as an accidental cause of stricture in the urethra, by producing either irritation, inflammation, ulceration, or perhaps sloughing in some part of the canal. The application of blisters in various instances have done the same thing; although the excitement from this cause, being of a temporary nature, the inconveniences to which it may have given rise do not often prove tedious.

Sect. 5.

On the most usual Seat of Stricture.

It has been already demonstrated that the most irritable parts of the urethra are the membranous and bulbous portions of the canal. It has been also

* See Cases, 25 and 26.

pointed out that in the first of these two situations there is a provision for an occasional spasmodic action of the muscular fibres of the urethra, as a circumstance essential to the complete effect of the most important function these parts have to perform. This, therefore is found to be naturally the most contracted part of the urethra, and it is by far the most frequent seat of stricture. Next to the membranous part the bulb of the urethra is most subject to contraction, although the same thing occasionally takes place in the other parts between the bulb and the external orifice of the canal.

Sect. 6.

Of the Symptoms produced by Stricture.

Stricture in the urethra is a disease which in its commencement is very rarely, if ever, observed. Its early progress is imperceptible, because it is not often productive of symptoms. It is natural to suppose that even in its beginning, as a stricture consists in a contraction of the canal, the diameter of the stream of urine must of necessity be lessened; but the same circumstance, it is well known, may arise from such various and trivial causes, that this symptom when alone is scarcely ever attended to by the patient.

The appearance of the stream of urine, may however have a more striking peculiarity, for in

some instances the first circumstance observed, is that the urine, as it passes from the urethra, assumes a spiral or twisted figure; and in the more advanced stages of the complaint it is not uncommonly divided into two smaller jets, and these circumstances will not only be found to vary in different cases, but in the same case at different times, according to various circumstances in the state of constitution, influencing the degree of contraction at the strictured portion of the urethra.

In the progress of the affection there is an occasional sensation of pain, in or about the contracted part of the urethra, and this is attended with some degree of frequency in passing the water, which circumstances are very apt to be reproduced, or increased, by the least irregularity in diet or exercise. As these attacks return, it is at last observed that the stream of urine is certainly much smaller than it should be, and as this remark is generally made at a time when more or less uneasiness is felt about the neck of the bladder, together with frequency and straining, in voiding the urine, the patient is at length induced to consult his surgeon, who, on passing a bougie, ascertains that there is a stricture.

The habit of frequent intercourse with women, generally exerts an unfavorable influence upon the early stages of stricture in the urethra. This arises from the temporary state of spasm connected with

the act, having a natural tendency to increase the permanent contraction previously existing in the canal. The same unfavourable influence however has now and then been found to arise in cases of stricture merely from the being in company with women, and this remark is more particularly applicable to other affections of the urethra, as gonorrhœa; at least I have repeatedly had occasion to make the observation. A young gentleman whom I had attended with gonorrhœa, had got entirely rid of all the symptoms; and thought he might again venture into company. His first visit was to the pit at the Opera House. The evening was moderately cool, and he took no refreshments whatever. The next morning he sent for me, told me what he had done, said the ballet had greatly interested him, but that to his great surprise he found the discharge had returned, and was just as bad as ever. In spite of all the usual remedies, it continued for more than three months afterward.

The irritation produced in the strictured part of the urethra, in consequence of the spasm that takes place during connection, is not confined in its effects to the mere increase of the contraction; it frequently excites a sympathetic uneasiness at the anterior extremity of the canal, with an increased secretion from the membrane lining that part of the urethra; and from the manner and circumstances under which this occurrence usually takes

place, it is particularly liable to be mistaken for gonorrhœa. A moderate degree of attention however, will be sufficient to enable the surgeon to distinguish between the two cases. The accession of the discharge is more sudden, and the inflammatory symptoms with which it is attended are infinitely more moderate, than in gonorrhœa; indeed the nature of the attack is such, that if it is let entirely alone it will in general subside spontaneously, in the course of a week or two.

As the disease advances, the contraction increases, the strictured part becoming so much smaller than natural, that the bladder is constantly called upon to make preternatural exertion, in order to get rid of its contents; under these circumstances the straining that was formerly only an occasional symptom in voiding the urine, becomes a more frequent source of inconvenience, and eventually never entirely leaves the patient.

Sect. 7.

Of Irritations produced by Stricture.

The irritation arising from a stricture in the urethra is productive of various symptoms, according to the state of constitution, and the particular circumstances of the case. Not unfrequently it is the means of exciting the natural actions of the parts at an improper time, producing nocturnal emis-

sions. This symptom most commonly occurs in unison with other circumstances that serve to clear up the nature of the case, but it is occasionally the first incident that attracts the attention of the patient.

In the further progress of the disease, the urinary bladder, subject to continual disturbance in the performance of its functions, becomes subject to increase of irritability from the most trivial causes, and the slightest cold will, upon this principle, be occasionally productive of considerable distress, exciting a material increase both in the pain and frequency of passing the urine, which is voided thick and turbid, but in small quantities.

These occasional attacks of increased irritation are not always confined to the neck of the bladder, the excitement is apt to be communicated more or less extensively to the parts around, and to the prostate gland particularly. In this case the progress and extent of the affection may be ascertained readily enough by an examination of the urine, which is found loaded with a considerable quantity of colourless glairy mucus, which subsiding to the bottom of the glass is distinguished by its transparency, while the urine above it is high coloured or turbid.

Where the disease still continues to advance, the attacks of irritation about the bladder come on more frequently, and prove more severe and harass-

ing to the constitution; in this stage of the complaint also, it not unfrequently happens that the irritable state of the bladder is found to operate as a cause of aggravation to the contraction in the urethra, the stricture becoming so much narrower that the urethra is rendered very nearly, if not completely, impervious. When the disease has reached this point it becomes essential to the patient's existence that the urine should find some other means of escaping from the bladder; a provision that must be made either by the efforts of nature, or the exertion of art.

Sect. 8.

On the subsequent Consequences of the Disease, Ulceration of the Urethra, Abscess, and Fistulæ.

In this stage of the progress of the disease there is usually a very considerable degree of permanent contraction in the urethra, to which is superadded occasional attacks of severe spasmodic action, connected with the other sympathetic affections that have been already described, and by the joint operation of these complaints several new consequences of the disease are now brought forward.

The continued irritation from the stricture excites perpetual uneasiness and discharge from the anterior part of the urethra. The constant exertion and aggravated straining to empty the

bladder, is productive of irritation, distension, and inflammation in that part of the urethra between the bladder and the stricture; and the inflammation so excited frequently proceeds to a considerable extent, spreading itself into the surrounding parts.

It is by this means, when unassisted, that nature seeks to relieve herself by the formation of a new passage for the urine, and this effort generally succeeds to a certain extent, inasmuch as it averts the danger which otherwise would in a few days prove fatal; although in its subsequent consequences the remedy proves sometimes almost as formidable as the disease.

The mode in which these changes are brought about is the following. The frequently repeated and almost unavailing exertions of the bladder to get rid of its contents, keeps up a constant pressure of urine against the sides of the urethra behind the stricture, in consequence of which this part of the canal suffers a gradual enlargement; but the same cause continuing to operate, the effect does not stop here; irritation supervenes, and this imperceptibly runs on to inflammation, frequently followed by a considerable effusion of coagulable lymph upon the surface of the inner membrane. Ulceration of some part of the inflamed surface subsequently takes place, and the urine makes its way out into the cellular membrane around the

urethra, thus producing an œdematous tumor either in some part of the perinæum, or scrotum, or both. In this way the irritation of the urine effused into the cellular structure, usually excites a sloughing inflammation beneath the integuments, in the neighbourhood of the perinæum, and either abscess or mortification, according to the state of constitution, is the result.

Where matter forms readily and is soon let out, the complaint may now take a favorable turn; and provided the patient's constitutional powers are not too much exhausted by what he has already gone through, the local irritation subsides to a certain degree; he finds his health improve, his appetite returns, and the sloughy cellular membrane separating the ulcerated parts contract, and all that ultimately remains may be one or more fistulous openings in the perinæum, through which the urine is either partially or wholly evacuated.

This ulceration of the urethra and the consequences derived from it can be prevented only by the timely relief of the stricture; when however the urine has once made its escape into the cellular membrane, producing inflammation and abscess, even the removal of the obstruction in the urethra will not always succeed, in relieving the complaints that have been derived from it.

Sect. 9.

Of the Sympathetic Spasm of the extreme Vessels.

One of the latest and most distressing sympathetic complaints to which stricture in the urethra occasionally gives rise, is a sudden attack of violent shivering, succeeded by feverish heat and sweating, an attack which is generally of so intense a character as to create, on its first appearance, considerable alarm for the safety of the patient.

This affection is not unlike the paroxysm of an intermittent fever, but it is much more severe, and is sometimes attended with delirium.

It is frequently the result of the application of caustic, and like the hæmorrhage that now and then occurs under the same treatment, it has been considered as a favorable circumstance, and a sign that the stricture is about to give way.

Sect. 10.

Of the Cartilaginous Stricture.

It has been already stated that the first commencement of stricture in the urethra, particularly where it occupies its most usual seat, is generally nothing more than an excessive contraction of the muscular fibres in some part of the canal, in which state the complaint stands unconnected with any

change in the structure of the parts; but when the disease has proceeded to such an extent as to have produced long continued irritation in the bladder, with the other consequences above noticed, the degree of the contraction in the urethra is not only much increased, but the nature of the affection as well as the structure of the parts is changed; the texture of the stricture becomes so firm that although the extent of the contracted part of the canal may still be inconsiderable, it nevertheless opposes a resistance that cannot be overcome by force; and a stricture in this state, when examined after death, is sometimes found to possess a degree of firmness very nearly equal to that of cartilage.

CHAPTER VIII.

ON THE TREATMENT OF THE DISEASES OF THE URETHRA.

SECT. 1.

On the Treatment of Spasmodic Stricture.

THE treatment of stricture in the urethra is directed upon one of two principles, and is intended either to remove the obstruction by relaxing the contracted part of the canal, without doing further violence to the parts; or if this fails, it professes to restore the passage through the urethra by the destruction of the stricture.

The first of these two purposes is applicable to the relief of spasmodic stricture, and is atchieved occasionally by the exhibition of opiate medicines, although in a surgical point of view, the principal means is the use of the bougie; the second object is generally directed to the removal of permanent stricture, and is most frequently accomplished by the application of caustic.

SECT. 2.

On the Use of the Bougie.

IN the early stage of stricture in the urethra when the contracted part of the canal is not very irritable, the bougie under proper management becomes not only the best instrument, but the only means necessary for the removal of the complaint.

Where this instrument is carefully adapted to the tone and degree of contraction of the stricture, the size of the bougie being increased as rapidly as the temper of the parts will admit, the affection may in many cases be removed without the intervention of any untoward circumstance, or the necessity for having recourse to any other mode of treatment.

But it frequently happens that when this plan has succeeded, and long after the use of the bougie has been laid aside, the disposition to contract shall return upon the parts, in consequence of which the patient finds his former symptoms recur, and it becomes indispensible to again have recourse to the bougie.

We see then, that the bougie although capable of overcoming the effect, which is the contraction, is not always equal to the removal of the cause, which is the disposition to spasm, in the part; but notwithstanding this apparent defect, the bougie is

still the most appropriate means we know of, and indeed all that is adviseable to recommend, in the way of treatment, while the moderate degree of irritability in the urethra admits of its being adopted as often as may be necessary.

Sect. 3.

Of the various Properties of various Bougies.

With regard to the comparative merits of the different kinds of bougies, there have been various opinions. The common wax bougie is that which is in most general use, and for several reasons I think it deserves the preference it has obtained among practitioners. Some surgeons are in the habit of using bougies formed of catgut, and in very contracted strictures that will not allow the smallest sized wax bougie to enter, the catgut bougie often proves useful, and may be tried with advantage. But it has been objected to the common bougie that it loses its proper consistence when allowed to remain in the urethra for any length of time, and this objection applies in a much greater degree to the bougie of catgut, which absorbs moisture rapidly, swelling, and untwisting its fibres to that degree as to occasion considerable irritation at the neck of the bladder, and giving great pain when it is withdrawn.

The bougie of elastic gum is certainly less liable to these inconveniences than either the catgut, or the common bougie; and it appears to me that in cases where stricture is connected with affection of the prostate gland, the gum elastic may be more usefully applied than the wax bougie, at least I have found it upon trial in two or three such instances answer much better, passing through the stricture with more ease, and slipping over the projecting parts of the enlarged prostate gland with much less uneasiness to the patient, and without exciting any of that irritation that would have rendered the introduction of the common bougie improper, a circumstance that can be attributable only to the superior softness which enables the elastic gum to follow with facility the course of the canal.

One quality considered desirable in a bougie is a power of receiving and retaining any particular degree of curvature that may be chosen, and upon this ground principally the metallic bougie has been introduced into practice. This bougie, at first view, might be expected to answer very well, but it is notwithstanding, in my opinion, a most objectionable instrument. There have been several instances in which these bougies have broken in the urethra, a part has escaped into the bladder, and it has been found necessary to save the patient from the ill consequences of irritation and inflammation of the

bladder, by cutting it out as in the operation for the stone.

It has indeed been asserted by those who recommend the metallic bougie, that even should this accident occur, there would be no difficulty in dissolving and bringing it away by injecting a quantity of mercury into the bladder, which it is said will form an amalgam, and the whole being thus reduced to a fluid state, will come away by the urethra. That this effect would take place in a mixture made in the elaboratory is very certain, but that the same result might be depended upon in the bladder of the living body appears to me very doubtful, where there is not only the urine but the various mucous secretions furnished by the internal surfaces of the kidneys, ureters, and bladder, which matters it is well known have a strong tendency to form a precipitate in the course of a few hours upon the surface of any extraneous body introduced into the bladder, a circumstance which must at least interfere with, or more probably entirely prevent, the mutual action of the metals upon each other.

Sect. 4.

Of the mode of applying the Bougie.

In using the bougie the point being somewhat incurvated upward, and the instrument lightly rubbed with oil, it is to be passed gently down the urethra

until the point stops at the contracted part. A moderate degree of pressure is then to be made against the stricture, and continued for a short time, but should the instrument not be enabled to pass, it must be withdrawn, and one of a size smaller substituted. By this means it will be ascertained what particular sized bougie is best adapted to the degree and tone of the contraction. The bougie determined upon should be so large as to pass the stricture with a moderate degree of pressure; the period for which it is allowed to remain must be regulated very much by the feelings of the patient, and the same rule must also direct from time to time an occasional increase in the size of the instrument.

In the use of the bougie however, it has been already shewn, that the least deviation between the line of pressure, and that of the natural course of the canal at the part where the point of the instrument may happen to be, is sure to do harm, as it invariably tends to lay the foundation for the production of a false passage; and the particular instance adduced*, where this consequence took place is sufficiently striking to prove that no person is equal to the task of introducing a bougie upon himself without the risk of getting into this dilemma, which, independent of all other inconve-

* See Page 157.

nience arising from it, must prove an endless source of embarrassment to the surgeon, when at some future time it may perhaps be essential to the life of the patient that an instrument should without delay be got into the bladder; for when a false passage is once made, it is sure to catch the point of any instrument that is passed, so that it becomes next to impossible to introduce either bougie or catheter by the urethra into the bladder, however great may be the urgency of the occasion.

The most likely means for enabling us to avoid this difficulty is suggested by what we learn from the morbid anatomy of the parts. We find almost invariably that when a false passage is produced in any part beyond the curvature of the urethra, it is on the posterior side of the canal, and consequently if the instrument passed has sufficient firmness to admit of its point being pressed against the opposite or anterior part of the urethra in its way on to the bladder, it may slip past the opening that leads out of the urethra, and by this means be enabled to reach its destination in safety.

Sect. 5.

On the Treatment of irritable Stricture.

Unfortunately, it often happens that a stricture that has formerly been very readily removed by the use of the bougie, becomes again trouble-

some, and proves subsequently much less manageable than it was at first. The strictured part of the urethra has acquired so great an increase of irritability, that the introduction of a bougie is attended with pain; its being retained in the stricture is productive of much distress, and if under these circumstances it is allowed to remain long in the urethra, but more particularly if the surgeon ventures to pass one a size larger than ordinary, the irritation is so increased that it either excites spasm at the neck of the bladder and retension of urine, or endangers the production of inflammation and abscess in the perinæum, inflammation of the testicle, or some other ill consequence.

The treatment of this irritable state of stricture will require considerable judgment; for although the degree of the permanent contraction may be so inconsiderable that were the irritation and disposition to spasm relieved, the urethra might be with ease brought back to its natural state of relaxation by the bougie, yet while the irritation remains upon the parts, it is difficult to determine what had better be done, for if let alone the stricture is sure to increase, and if meddled with in order to its relief by the bougie, the attempt only serves to aggravate the disease.

Sect. 6.

On the Application of Caustic.

It is in this case as well as in the more advanced stages of the permanent stricture that the application of caustic has been recommended; and where the circumstances of the case are suited to the treatment it certainly becomes an invaluable remedy; but it is a remedy that sometimes very materially involves the future comfort of the patient, on which account it should never be hastily determined on.

The escharotic applications in present use are the lunar caustic, and the caustic vegetable alkali. As to the particular manner of employing these substances, the lunar caustic is applied by letting a small piece into the point of a wax bougie, which being passed down to the seat of the affection, is pressed against the stricture for the space of a minute, so as to produce a superficial eschar. The caustic alkali is used much in the same way, but in a much smaller piece, for the intention here is the complete solution of the whole quantity of caustic introduced; in which case the caustic forms a fluid, that is diffused over the strictured part of the canal, and is found to diminish spasm, although it does not operate with the same local severity as the lunar caustic, by destroying the parts touched.

Now, although the simple bougie is liable to do harm by bringing on or increasing irritability in the

stricture, so as to aggravate the complaint it was intended to relieve, it has been ascertained that the armed or caustic bougie has the power of acting on the stricture, while so far from being objectionable on the same ground as the simple bougie, it most commonly is found to operate by diminishing very materially the irritability of the parts.

In the irritable stricture at present under consideration it will sometimes be impossible to pass even the smallest bougie, or perhaps one of a small size may be made to pass, but will not fail to aggravate the distress of the patient. With a view to the relief of this stage of the complaint the application of lunar caustic has been recommended, because it is capable of progressively acting upon, or in other words destroying, the whole of the stricture, and because as it has been very justly stated, from its tendency to relieve spasm, it may remove a part of the stricture and relax the rest. With the same view the caustic alkali has been recommended, and it has been represented as capable of accomplishing the relaxation and relief of the stricture upon easier terms than is usual with the lunar caustic; and judging from a pretty extensive experience I am persuaded that the caustic alkali is the most generally effectual, as well as the most safe of the two applications, in the irritable state of stricture.

I am not aware that the rationale of the action of the caustic alkali in stricture has ever been entered

upon further than by the mere statement of the fact that it tends to relax spasm and diminish irritation; it appears to me however, that the principle upon which it operates is clearly the same that I have already endeavoured to explain in relating the effects produced by the internal use of the alkalies, in diminishing irritation of the bladder. *

SECT. 7.

On the Treatment of the Sympathetic Spasm upon the Skin.

As to the treatment required for the relief of the feverish paroxysm which occasionally attacks those who are labouring under stricture, it is very simple. The patient should be immediately laid in a warm bed, and drink plentifully of hot tea, or hot spirits and water, or if the moderate severity of the attack will allow of it, he may first take an aperient draught with a view to clear the bowels, and subsequently a pretty strong dose of opium, so as to favour the establishment of a copious diaphoresis, which generally effects a complete solution of the attack.

SECT. 8.

On the Circumstances under which Local Treatment should be suspended.

WHERE repeated attacks of aggravated spasmodic contraction have rendered a stricture exceedingly

* See Page 79.

distressing to the patient, and have perhaps been also connected with irritation about the neck of the bladder, it may be unadviseable to meddle with the stricture, unless in the most gentle way possible. The degree of irritation in the bladder may forbid the adoption of any but the most cautious measures. Although the strictured part of the urethra may be so contracted as to be almost impervious, it may be still necessary to confine the treatment for a time to the exhibition of opiates, the use of the warm bath, and the other means known to alleviate spasm.

Sect. 9.

Of the Treatment of Permanent Stricture.

It has been observed that when a spasmodic stricture has been of long standing, and frequently subjected to attacks of severe irritation, sometimes inducing a degree of inflammatory action, the usual consequences of inflammation take place, coagulable lymph is effused, and consolidation of the cellular structure is the consequence, so that what was at first a spasmodic action only, becomes converted into a permanent stricture.

Now in proportion as this change takes place, the treatment must be changed with it. The application of caustic may still be required, and may still prove successful, but the milder or alkaline

caustic will not succeed. The contracted part of the urethra is no longer capable of being relaxed, and the only mode of removing the stricture is by destroying it. This forms the fairest case for the lunar caustic, provided the contracted part does not include any considerable extent of the canal of the urethra; and notwithstanding some practitioners have of late thought fit to enter their protest against the use of caustic altogether, it seems to me that these gentlemen have taken a very superficial view of the subject, otherwise it must have appeared even to them, that in various instances these diseases are not at all manageable by the bougie alone, although from the satisfactory list of cases brought forward, all ending well, it would seem that a patient's only anxiety need be exerted in the selection of the right surgeon; one who even professes to consider his patient's feelings with so lively a sympathy, as to persuade himself that it is not necessary to give pain, but that the objects of surgery may be attained just as effectually without any such inconvenience.

The particular situation as well as the other circumstances connected with stricture, will have some weight in determining the propriety of attempting the cure by the lunar caustic. The nearer the orifice of the urethra the obstruction may be, the more readily and more securely may the application be made; and the nearer the neck

of the bladder the more uncertain the exact direction in which the caustic may act. The curvature of the urethra, and the natural elasticity of the canal are difficulties in the way, and even with the simple bougie, which acts only by mechanical pressure, there is considerable uncertainty in operating upon a stricture situated at the membranous part of the urethra, provided the contraction is such as to prevent the instrument passing through it.

Sect. 10.

Of the Hæmorrhage occasionally produced by Caustic, and of the other Modes of removing permanent Stricture.

The strongest objection urged against the lunar caustic is the hæmorrhage that in certain cases has followed its application, and from the extent to which this accidental bleeding has occasionally proceeded it is undoubtedly an objection, but to determine this or any other argument fairly, it is necessary to consider both sides of the question. The lunar caustic is never proposed, or at least ought not to be, unless in extreme cases, where the object is to restore the natural passage for the urine, instead of allowing it to continue to escape as it generally has done previously, either by fistulous openings in the neighbourhood, or perhaps involuntarily, or at the least, almost constantly

and with extreme distress to the patient, in either case obliging him to drag on an irksome existence, loathsome to himself, and offensive to others.

To relieve him from the miserable prospect which this state affords for the rest of his life, is the proper object of surgery, and there are various modes of attempting the accomplishment of it; but they are all painful, and all more or less uncertain as to their eventual success.

Upon these grounds then, it becomes right to explain to the patient beforehand the comparative merits of each method of treatment, that he may, if he chooses, determine for himself. It appears to me that the lunar caustic is in such cases deserving of the preference. It is true the stricture may in most instances be cut down upon by an operation, and may in this way be either laid open, or entirely dissected out, allowing the parts to heal over an elastic gum catheter, in which case the patient may do well, and even perfectly recover; but this is a very severe operation, and attended with considerable hæmorrhage. Or by passing a silver canula down to the stricture, a fine spear pointed instrument may be conducted to the part, and may be thrust through the stricture so as to divide it, and perhaps in this way a passage may be restored to the sound part of the urethra beyond, the divided part being subsequently made to heal over a bougie or catheter.

Of all these modes however, where extreme irritability of the bladder and urethra do not form an objection to it, and particularly when the situation of the stricture is favourable, the lunar caustic forms the least exceptionable remedy, and promises relief according to my estimate, upon easier terms than any other kind of treatment, under these distressing circumstances.

The application of the lunar caustic operates by producing a superficial slough upon that part of the stricture with which it comes in contact, and it is consequently necessary in every instance to wait until this slough is separated before the caustic is again applied.

As to the number of times that the application of the caustic may require to be repeated, this will vary exceedingly in different individuals, dependant on the circumstances of each particular case; in some instances it has been considered necessary to continue this treatment with occasional intermissions for many months.

Sect. 11.

On the Mode of ascertaining the Operation of the Caustic.

From the length of time sometimes required to enable the surgeon to overcome the obstruction, it becomes necessary to ascertain with accuracy

from time to time, the exact progress the caustic has made, in order that it may appear whether it is making its way fairly through the stricture, or whether on the contrary it may not be forming a new passage for itself, leading out from the proper line of the urethra. This information is to be acquired by occasionally passing down a soft bougie, and keeping up a gentle pressure against the stricture for some minutes, until having become warm, it has taken the exact impression or figure of that part of the canal; it is indeed customary with most surgeons, to pass down a plain bougie of as large a size as convenient, previous to each application of the caustic, with a view to clear the canal, and at the same time to determine the exact distance of the stricture from the external orifice of the urethra.

Sect. 12.

On the Operation of puncturing the Bladder.

In the history of stricture it was observed, that where the progress of the disease is considerably advanced, a degree of spasm occasionally takes place, which may altogether prevent the passage of the urine by the urethra, and that it then becomes essential to the life of the patient that the contents of the bladder be enabled to escape by some other channel, which must be provided either by nature, or art. Where this provision is of

the first kind, it is formed by those fistulous openings from the bladder, the nature of which has been already explained; where of the second, it consists in the puncture of the bladder, an operation which has been variously performed, but in all cases with one and the same object, that of relieving the bladder from its load, and preventing its bursting from accumulation of urine.

The puncture of the bladder has been proposed to be made in one of three ways, either by passing in a trocar through the abdominal parietes above the pubes, or by introducing the same instrument by the perinæum into the bladder, or lastly by puncturing the bladder through the rectum.

The operation has been successfully performed in each of these situations, but as the puncture from the rectum has most frequently terminated well, and as it is in my opinion, on several accounts, infinitely superior to either of the other methods, I shall only say a few words more in explaining this particular mode of relieving the bladder.

The trocar need not be larger than that which is employed for hydrocele, although it must be somewhat longer, and should have a gentle even curvature. The form of the instrument should be that of the common trocar with a triangular point, as I have seen that the lancet pointed trocar is sure to divide whatever blood vessels fall in its way, while the triangular point pushes them aside without further injury.

As to the position of the patient it is not very material, the operation may be conveniently enough performed as he lies in bed.

The fore-finger well oiled is to be first passed up into the rectum, and the general degree of fulness of the bladder, as well as the most convenient point above the prostate gland, ascertained. When these circumstances are satisfactorily made out, the trocar pushed nearly but not quite through the canula, is to be gently introduced, and passed up until the extremity of the canula corresponding in situation with the point of the finger already in the rectum, is felt to be against the part where the puncture is to take place. The canula being then in the least degree retracted, while the stilet is pressed forward, places the instrument at once in a fit state for making the puncture; keeping in view the line of direction tending to the centre of the distended bladder, the trocar is now to be steadily passed forward through the coats of the intestine and bladder, when the stilet being carefully withdrawn, the canula must be retained, and the urine allowed to pass off.

As the accidental slipping of the canula out of the orifice in the bladder has been productive of inconvenience from the premature healing of the wound, and the consequent necessity for making a fresh puncture, it is desirable to have a little plate attached to the external part of the canula,

perforated with holes, so as to admit of its being secured to a bandage passing round the waist and between the thighs. This precaution however, generally becomes unnecessary after the first week or two, as the opening usually very soon loses its disposition to heal, until the restoration of the natural passage of the urine renders it useless.

Case 19.

Spasm of the Accelerator Urinæ Muscle, from Affection of the Prostate Gland.

Mr. William G. a married man, aged 34 years, consulted me in April 1810. He said he was subject to a most distressing and severe pain, which generally occurred when on the water-closet, the uneasiness always commencing at the instant the motion was passing. The severity of this pain he said, was frequently acute beyond all description. At times it had produced fainting, and it generally brought out a sudden and copious perspiration. The seat of this affection was invariably the same. It commenced at the anterior point of the anus, extending thence for some distance forward, in the direction of the urethra.

These attacks were more or less severe, and they appeared to vary according to the state of his general health. Any bodily fatigue, but especially any vexation in business uniformly aggravated the complaint. The pain however was not productive of

any material inconvenience in making water, neither did it continue at any one time, beyond the space of a few minutes.

On inquiry he said he was not able to attribute this singular affection to any particular cause, unless it might in some way have been connected with a gonorrhæa of which he had been cured about five years before. The discharge at that time had certainly been removed by an injection, and he very soon afterward had experienced the first of those attacks of which he still complained.

He said he had taken several opinions, and that one of the surgeons had pronounced it to be the internal piles, and another had told him it was a stricture in the urethra, and could only be relieved by the repeated application of caustic; he had even allowed the introduction of the armed bougie once, but finding no relief, and suspecting something wrong, would not permit this treatment to be continued.

He observed that the complaint in question did not very much interfere with his habits of life, although of late he had found riding so frequently bring it on, that he had not been able to use his horse and chaise for the last six months.

The urethra was first examined, and was found very fairly and equally relaxed, a full sized bougie passed forward without interruption into the bladder. I next examined the state of the rectum, where there was nothing to indicate hæmorrhoidal

disease, but on pressing forward, the prostate gland was felt rather more distinctly than ordinary. At that instant he started and cried out in great agitation that I had now found the real seat of his complaint. When the part was touched ever so lightly, the peculiar pain was immediately produced, which, as he described it, was neither seated in the coats of the intestine, nor in the general body of the prostate gland, but in the old spot, a particular point at the inferior part of the gland, anterior to the sphinctor ani muscle, and extending itself from thence for about an inch along the perinæum.

With a view to the relief of these symptoms, a draught containing some of the compound tincture of bark was directed to be taken every morning, and an opiate to be taken occasionally, when the pain came on. He was also requested to avoid all such exercise as might tend to heat or disturb the parts locally, to keep the bowels regular, and to use the shower bath every morning.

When the pain came on with unusual severity, he was desired not to wait the effect of the opiate, but to take a glass of hot brandy and water, as he had proved the efficacy of this remedy by previous experiment, and had repeatedly found it operate to his relief almost instantaneously.

In addition to the above plan a large sized bougie was passed into the bladder twice a week, with a view to favour the more complete relaxation of

the fibres of the accelerator muscle, in which there was every reason to believe the spasmodic disposition existed.

Under this treatment he improved, and in the course of three months found himself more free from his complaint than he had at any time been for the last three years. Within six months he had perfectly recovered.

Case 20.

Spasmodic Stricture.

Corporal J. Keenan, of the 82d regiment of foot, aged 27, had for some weeks observed that the stream of his urine was becoming smaller than usual, when on Sunday morning, August 28th, 1808, he paraded for church. He felt a desire to pass his urine while the regiment was going into church, but did not chuse to fall out of the ranks. He therefore waited till the service was over, but on making the attempt found to his great surprize that he could not pass a drop. The effort was attended with much pain, followed by violent straining, and a few drops of blood. The desire to pass his water came upon him very frequently, every attempt being productive of considerable pain, and bearing much down. He was out of bed eleven times the following night, without being able to pass any water, and on the Tuesday he attended at the hospital, and related the above circumstances.

I passed a bougie of moderate size, and a yielding obstruction, which as the instrument passed through it gave much pain, was perceived six inches from the external orifice. It was however overcome by a pressure not more than equal to an ounce weight. Much pain continued to be felt at the part where the contraction had taken place, for the minute that the bougie was allowed to remain in the urethra.

On withdrawing the instrument he was desired to see if he could pass his urine, he made the attempt and succeeded in getting rid of about an ounce, but it flowed in a very contracted stream, the close of the act was attended with straining, and a few drops of blood followed. He said he had now passed his water not only more copiously, but with much less pain, than at any time since the attack.

In the course of his walk from the hospital to the barracks, up a steep hill, he repeatedly experienced an inclination to pass his water, which each time flowed with more freedom than before. The night before he had been up nine times, but the night following the introduction of the bougie he was up only twice, and the night after this again, he was not disturbed at all, the symptoms having entirely left him. On making a second examination with the bougie, a few days afterward, the canal was found free from any obstruction, and the stream of urine was apparently as large as ever.

About a month previous to the above attack, he had spoken to me on account of a discharge from the urethra, which came on suddenly after connection with his wife, a circumstance which as he could not explain it, gave him some alarm, for he acknowledged that only four months before, he had been in hospital for a venereal bubo, with gonorrhæa; which complaints had been treated by the mercurial frictions alone. The bubo had suppurated and healed, and the gonorrhæa had subsided very readily, unassisted by any local means.

On this occasion I had desired him not to allow the discharge in question to give him any uneasiness, acquainting him at the same time, that he might with advantage bathe in the sea every morning, while the weather remained warm. He did so, and the discharge disappeared spontaneously in the course of a few days.

Case 21.

Spasmodic Stricture.

Mr. O. a gentleman 32 years of age, desired my opinion August 4, 1811. He said his general health was very good, but that for some months past he had been troubled with a weakness which prevented him from being at all times able to retain his water. On enquiry it did not appear that the stream of urine was materially diminished, neither had he ever found himself subject to difficulty in voiding it.

On passing a bougie of moderate size down the urethra a stricture was met with at six and a half inches from the external orifice. This was merely an instance of spasmodic contraction, which by a moderate degree of pressure gave way, and the instrument passed on to the bladder, where it was allowed to remain ten minutes.

The operation was attended with some pain in the situation of the stricture. The introduction of the bougie was repeated every second day for a fortnight, when the passing it no longer gave pain, while the power of retention was much more perfect than before.

For the following ten weeks a full sized bougie was introduced every third day, by which time the urethra being restored to its natural state of relaxation, he had completely recovered the power of retaining his urine, and I consequently took my leave of him.

Case 22.

Spasmodic Stricture.

Mr. H. a gentleman aged 36 years, applied to me, February 7, 1812. His principal complaint he said, was an acute pain that was apparently situated in the urethra, near the neck of the bladder. This pain was not at all times equally troublesome, but was generally particularly distressing subsequent to connection. He observed that when-

ever this pain was very severe, he found that his urine passed in a diminished current, although at other times he thought it flowed freely enough.

I requested he would allow me to pass a bougie into the bladder to ascertain whether there was any obstruction forming; to this he agreed, and a bougie of full size was introduced, when a stricture was found at six inches from the external orifice. The obstruction however was easily passed with a bougie of smaller diameter, and by repeating the operation at regular intervals, and gradually increasing the size of the instrument, the urethra was so fairly relaxed that in the course of six weeks he felt no inconvenience from a full sized bougie being passed forward into the bladder; neither was he any longer subject to those uneasy sensations, and spasmodic affections, that had previously been a source of distress to him, as often as the parts were called upon to perform their natural actions.

Case 23.

Spasmodic Stricture.

J. Davis, a very hard working man, a lamplighter, aged 35 years, applied for assistance to the St. George's Infirmary in May 1810. In his account of his complaints he said that as long as nine years before, he had experienced the first attack of stoppage in his water subsequent to great fatigue,

but he was the same evening relieved, by drinking hot spirits and water.

About a twelvemonth afterward he had a second attack which proved obstinate, a complete retention continued several days, producing considerable swelling and exquisite pain in the region of the bladder, although latterly a small quantity of water occasionally dropt from the urethra. Obliged at last to complain, he applied to an apothecary, and the medicine he took operated in about an hour, and entirely removed the complaint.

An interval of two years now passed, when the complaint returned, and remained upon him with more or less violence for the space of a fortnight; during this time he was able to get rid of his water, but it was with considerable difficulty. At the end of the fortnight he applied for assistance. On this occasion the contraction in the urethra was overcome by mechanical pressure, a bougie was introduced, and passed the stricture, which on being once relaxed did not contract again.

In 1808, another attack came on, which was relieved by the bougie.

In January 1810, his complaint again returned, he now stated that he had been repeatedly relieved by the use of the bougie. One of a full size was therefore passed down to the stricture, but the contraction could not be overcome. The pressure by which the instrument was urged forward was

rather considerable, and upon withdrawing it, a degree of bleeding followed, and he lost several ounces of blood.

The warm bath and opiates completely relieved him in twelve hours.

In May 1810 he again complained, and on making the attempt to pass his water, could not get rid of a drop. A bougie of moderate size was stopt at five and a half inches, and could not be made to pass further. A few drops of blood followed its removal. The bougie was grasped by the urethra with so unusual a degree of firmness, that to withdraw it required a force more than equal to a pound weight. The warm bath, and repeated doses of the compound powder of ipecacuanha, aided by a day's rest from his work, enabled him again to pass his urine.

Towards the latter end of the month he had a relapse, in consequence of which he was unable to make a drop of water. As the retention was complete, and rest seemed indispensable, he was advised to come into the Infirmary, and he did so on the 21st. His former treatment was now had recourse to, without success, until the 24th, when he began to void his urine, although in very small quantity. But he now complained of a swelling with heat and extreme tenderness, which had taken place upon his left hand, particularly affecting the last joint of his little finger. The hand was well fomented. The next

day (the 25th) the hand was getting much worse, and the same kind of pain was with great violence felt darting through the fore finger of the right hand. Fomentations were directed to both the hands. In the course of the evening the whole of the right hand became as severely affected as the left.

On the 24th he had been able to pass his urine in a very small stream, with much painful exertion, and great straining. In the evening the stream was observed to be much more full and free. On the 25th the urethra was still more relaxed, and the straining to pass it had nearly subsided. In describing his own feelings, he said, that immediately the pains came on in his hands he found the complaint about the bladder began to mend.

On the 25th his right knee became affected with extreme pain, heat, and swelling, and on the 28th the left foot became painful and inflamed. The pulse was small and hard, beating 112 in the minute, and he said he had occasionally some pain in the head. On examining the right knee there was evidently a considerable effusion of fluid within the capsular ligament of the joint, by which the patella was raised up from its situation. The integuments were somewhat tumid; and giving motion to the joint produced acute pain.

By rest, and diaphoretics, he soon began to mend, but on the 9th of June his retention of urine re-

turned upon him, with repeated and distressing desire to empty his bladder. This attack however subsided spontaneously, in about two hours.

On the 23d of June he found the inflammatory affection of his hands much increased, but without any correspondent relief to the state of the urethra. He had lately taken opiates in other forms, and was now directed the compound powder of ipecacuanha. Under this plan he continued to mend, and was soon able to leave the house, returning to his work.

September 24th he experienced another attack of complete retention, and came to me the following morning in great pain, begging me to pass an instrument to draw off his water. Bougies and flexible catheters were introduced, but to no purpose. I therefore directed him to go home, wrap himself in warm blankets, and take ten grains of the compound powder of ipecacuanha every two hours till he was relieved; by these means his complaint was in the course of the day entirely removed.

After this he remained pretty well till November, when the irritation and spasm returned upon the urethra in full force, but was again relieved in the course of twelve hours by the compound powder of ipecacuan.

From this period he enjoyed tolerably good health, till the latter end of the following year,

In September 1811, he was admitted into the Infirmary and was confined to his bed for near four months by a most severe attack of the old complaints in his joints and limbs.

For more than two months he could neither feed, stand, or move himself. The stricture was at this time troublesome, so far as to render him repeatedly unable for a day or two to pass any water without great difficulty, but when his rheumatic gout began decidedly to mend, a most distressing degree of irritation settled itself upon the bladder. The desire to pass the water was now extremely frequent, as well as violent. Sometimes, notwithstanding the use of the warm bath, opiates, and other medicines, he was unable to pass a drop for two or three days together, while the violence of the efforts in straining were severe beyond description. From this state he recovered so slowly, that it was the latter end of December before he was well enough to be able to return to his employment.

In December 1813, he came again into the House, with a renewed attack of the rheumatic gout, which in this instance had entirely deprived him of the use of his limbs. All the joints of the hands and fingers, feet and toes, were severely affected; but the first joint of the left little finger was particularly painful. It produced more swelling and heat than before, threw out chalky matter,

and was followed by anchylosis of the joint. As he could never be persuaded to allow of any regular or continued treatment for the further relief of his stricture, that contraction which was formerly pure spasm, was now to a certain extent, a permanent state of stricture. He was however generally able to get rid of his water, although it was always passed in a very small stream, and sometimes with great difficulty.

In January 1816, he was again taken into the Infirmary, where he remained for several weeks entirely helpless from the gouty affection of his joints. The stricture however, remained much the same.

This case affords an interesting illustration of the circumstances under which spasmodic stricture frequently commences, and of the symptoms that generally usher in the change from a spasmodic to a permanent state of contraction, in the urethra. While the affection was pure spasm no mechanical force could be made to overcome the contraction, although it might with certainty be removed by the exhibition of diaphoretic and antispasmodic remedies; but as the state of the stricture changed, the same medicines, which at first never failed, operated with diminished power, and eventually lost their effect altogether.

Case 24.

Sloughing of the Urethra, and consequent Stricture, from external Violence.

Major W. a Field Officer, on the staff of the Duke of Wellington's army in Spain, met with an accident while on duty. On the 3d of December 1812, while employed in inspecting a large house preparatory to its being converted into an hospital for the wounded, he was ascending an old staircase, when a part of it gave way, and he had nearly fallen through. By this accident the perinæum was violently bruised against the edge of a plank.

The most acute pain immediately came on, and inflammation quickly followed. He continued however in the fulfilment of his duty for four hours afterward, although he was then obliged to report himself, being no longer able to keep his feet. He felt constant and urgent desire to make water, although in the attempt he was only able to expel a few drops of blood.

The tumor and inflammation soon became considerable, for which poultices and fomentations were diligently applied, but as every endeavour to introduce an instrument by the urethra proved unsuccessful, it became necessary to puncture the bladder.

This operation was performed by one of the staff surgeons * who happened to be upon the spot, and

* C. Boutflower, Esq.

the puncture was made from the rectum, about 48 hours subsequent to the receipt of the injury.

By the eighth day the bruised parts had suppurated, the swelling having formed an abscess and burst, when an attempt was again made to introduce a silver catheter, which after much difficulty succeeded. The instrument was left in the bladder, but unfortunately, it only remained till the following morning, when it was expelled by the action of the bladder, and could by no means be again introduced.

In the course of the night, subsequent to puncturing the bladder, the canula by some means slipped out of its place; but the urine continued notwithstanding to pass very freely through the opening, while the sloughing and abscess was taking place in the perinæum.

On the fourteenth day the discharge of urine by the rectum had entirely ceased, by the healing of the opening in the bladder; in consequence of which there was again a complete retention for the space of two days. Fortunately, however, the slough at this time gave way, and the urine rushed out by the separated part of the urethra. In a few days more the slough was completely detached, and the wound clean and healthy.

It was now an object to introduce a catheter through the urethra, with a view to the parts subsequently healing over it. The instrument was readily

enough passed down to the part where it became exposed upon the ulcerated surface, but it was found difficult to find the precise point at which the continuation of the urethra led on into the bladder, it was at last ascertained by watching the moment of the expulsion of the urine.

An elastic gum catheter was first passed, but it created so much uneasiness and irritation that it was found necessary to change it for the silver catheter, which remained quiet, being removed only occasionally, for the purpose of keeping it clean.

In about six weeks the granulating mass had closed round the instrument, and supplied entirely the deficient part of the canal, which had sloughed off, to the extent of an inch. The external wound was very soon completely healed, and he returned to his duty.

Some months afterward he came to England, visited London, and consulted a surgeon of eminence in the city, who failing in his attempt to pass a small sized bougie, stated that the only mode was to clear the way by the lunar caustic. To this proposal however not chusing to submit, he discontinued his attendance, and was recommended to take my opinion.

A bougie of moderate size stopped at six inches, and one the diameter of which was one-tenth of an inch passed with difficulty through the contraction at this part. After remaining quiet for about three mi-

nutes it excited some uneasiness, and was withdrawn. The introduction of a flexible gum catheter he was rather averse to, from its having formerly made him very uncomfortable, and a silver catheter was therefore selected, the diameter of which rather exceeded that of the small bougie; it passed the stricture with more ease, remained quiet a longer time, and was removed with less pain than the bougie had been. These circumstances naturally led me to consider the silver catheter a preferable instrument in this case to the bougie.

The opinion I gave him was that the application of the caustic was not adviseable, being unnecessary; for that the urethra seemed disposed to allow of the necessary dilatation being effected, under proper management, upon much easier terms; and with this opinion he expressed himself satisfied.

A silver catheter, the eyes of which were previously made very smooth, was introduced, and allowed to remain in the stricture for a few minutes, till it created some uneasiness in one of the testicles. It was then withdrawn, and he was requested to keep quiet for the day, to suspend the testes, and to take ten grains of the compound powder of ipecacuan, at night.

This plan was continued for some time, the catheter being regularly introduced every second day. After the first fortnight the instrument was changed for one a size larger, but as the eyes of the catheter

had occasioned a degree of uneasiness and even pain in passing the prostatal part of the urethra, I had some silver sounds made, exactly resembling the catheters, but without any openings at the extremity. These answered beyond expectation. The uneasiness experienced, and the occasional pain felt were much less frequent, and comparatively trifling.

In the course of the treatment it was observed, that after every change to an instrument of larger size, it was necessary to have recourse to rest and an opiate. The neglect of these precautions, or the least irregularity in wine or diet, invariably put him back in his progress, obliging me sometimes to be content with passing a sound of a smaller size than that which had preceded it.

From an accidental neglect on one of these occasions, a swelled testicle came on, and it became necessary to lay aside the use of instruments altogether for three weeks.

By these means alone, the contracted part of the urethra was enlarged in the course of five months to a very adequate degree. The instrument which passed with ease at the end of this period was seven sizes larger than could be introduced at the commencement of his attendance, and was only two sizes less than a very full sized bougie.

As he was about to return to the peninsula, he was recommended to carry with him two or three

sounds of the most suitable sizes, with a view to pass them about every fortnight or three weeks, to prevent the parts from becoming again contracted.

I had the pleasure of receiving a letter of consultation from this gentleman in February 1816, in which however he expressed some uneasiness at not being able to continue the use of the same instrument which he had been in the habit of introducing when he left town. But as the next size smaller was very adequate for every necessary purpose of security, he was advised to rest satisfied with the introduction of it, observing at the same time carefully to avoid all those circumstances that might tend to bring irritability upon the parts.

Case 25.

Stricture in the Urethra, with Irritable Bladder.

Mr. W. a gentleman about forty, had for many years laboured under strictures in the urethra, which had produced abscesses and fistulæ in perinæo, occasionally connected with severe attacks of irritation at the neck of the bladder, all which complaints had been originally the consequence of injecting to cure a gonorrhæa.

In May 1813 he consulted me, because he said his complaints were so much worse than usual as to render it necessary to adopt some means for his

relief. There were two fistulous openings in the perinæum by which the greater part of the urine was voided, a fresh abscess also was forming, with considerable heat and inflammation in the integuments at the posterior part of the scrotum. There was so much irritation about the bladder as to oblige him to pass his water with extreme pain every fifteen or twenty minutes. He had for many years been in the habit of occasionally passing one of the smallest sized silver catheters into the bladder, so as to afford temporary relief by drawing off the water, but at this time the canal was so much contracted that it was not possible to introduce the smallest sized bougie further than half an inch down the urethra.

For these complaints warm fomentations, poultices, and opiates were first directed, with a view to bring forward the abscess in the perinæum, and at the same time relieve the irritable state of the parts. The swelling in a few days gave way, and suppurated freely, and in the course of a week the general irritability of the parts was so far alleviated as to admit of some attention being paid to the state of the urethra.

The stricture at half an inch from the orifice was at once so firm and so irritable, that after making repeated trials with the common bougie there seemed to be no prospect of gaining any real advantage by this means alone. The contraction was such as only allowed the smallest sized bougie to pass, and

even this never failed to produce extreme pain and irritation in the urethra, bladder, and perinæum.

From the constant pressure of his connections in business, and the impossibility of his attending to it in his present situation, I was requested to lose no time, but to proceed in any way that appeared least objectionable. I therefore determined to propose the lunar caustic; it was at once acceded to, and an armed bougie was accordingly selected of a moderate size, but yet sufficiently large to admit of the same treatment being carried forward to the more internal parts of the canal, in the event of its being found necessary.

The common bougie was first passed, and pressed moderately against the stricture, giving extreme pain scarcely to be borne; the armed bougie was next introduced, and pressed with the same degree of firmness as the other had been, but it gave much less pain. It was retained against the stricture for the space of a minute, and was then withdrawn.

The caustic bougie was applied every second or third day for near three weeks without apparently making much progress, although the irritation of the parts certainly continued to decline. The application of the caustic in fact was found to be so much less painful than that of the unarmed bougie, that the patient said he was clearly satisfied in his own mind, that provided I had considered it right to apply the caustic without previously intro-

ducing the common bougie, the pain produced by the operation would be comparatively nothing.

At the end of this period, on pressing forward the common bougie the stricture gave way, and allowed the instrument to pass on to six and a half inches, where it was again stopped. It was therefore withdrawn and one a size smaller was introduced in its stead, which with a little hesitation went forward into the bladder. The common bougie was now passed every second day for a month, and succeeded in preserving a sufficiently relaxed state of the canal; a much larger proportion of the urine now passing off by the urethra than before, at much longer intervals, and with infinitely less pain.

At this time he was recommended to introduce a moderately sized bougie about once every fortnight or three weeks, and I took my leave.

On the 7th of January, 1816, a bougie of elastic gum was passed, and allowed to remain in the urethra during the night. In a few hours after retiring to bed he awoke in great uneasiness, and found the bougie had so nearly escaped into the bladder that with extreme difficulty he at last succeeded in pressing back the glans penis far enough to enable him to take hold of the end of the bougie in the orifice of the urethra, so as to withdraw it.

A most severe attack of irritation in the bladder was the consequence of this accident, and upon this account I was again desired to visit him. The pain and

frequency in making water were excessive, and although obliged to make the most violent efforts to empty his bladder every ten minutes, he was sometimes totally unable to expel the urine.

As to the appearance of his water it was for the first few days of the attack very clear, and deposited little mucus, although numerous small shreds of white opake coagulable lymph passing by the urethra, occasionally impeded the flow of urine. By degrees however, the quantity of sediment increased, while the appearance of shreds or flocculi diminished; the mucous deposit was of so thick a consistence that the water was passed with more difficulty than ever.

The quantity of opake white sediment was now very considerable, and on examination after it had stood for some hours, numerous portions several inches long floated up in the urine, although even these were in some degree connected with the general mass that lay at the bottom. These tenacious mucous filaments were many of them formed in the bladder, and the straining to get rid of them by the urethra was so great, that at times the urine was tinged with blood.

For these complaints I first directed fifteen grains of the compound powder of ipecacuan twice a day, as this medicine had on former occasions proved useful to him, and indeed in the present instance it seemed at first likely to be successful. He was also

requested to take the simplest and least stimulating diet, to drink barley water, and to avoid all fermented liquors.

Still however he continued to be so constantly and painfully disturbed through the night as well as day, that he was never able to get five minutes rest; but it was difficult to determine on a plan which under all circumstances might with certainty prove more useful.

January 10. As the compound powder of ipecacuan appeared to have entirely lost its power in relieving the irritation, he was directed to lay it aside, and take instead of it sixty or eighty drops of the tincture of opium, at bed-time.

February 13. He was not in the least better, nor had the tincture of opium had the desired effect in procuring rest, or alleviating his distress, opiates were therefore now altogether given up, and he was directed to try the effect of the carbonic acid, by taking the ærated soda water; of which he drank three half pints daily. He was also allowed to take porter, but not wine.

In the course of the second day of his taking the soda water it had evidently begun to operate in his favour, producing a gradual abatement of all the symptoms. In a few days more the appearance of the mucous matter contained in the urine was decidedly altered, there was less tendency in it to coagulate firmly, and with less tenacity there was more of a

purulent appearance; this change alone was relief, because in the one state the secreted matter blocked up the passage of the urethra, in the other it did not.

February 15. He mentioned that now some small pieces of reddish coloured gravel or sand had made their appearance, and these occasioned additional pain in making their way along the urethra. Some of this matter dried on paper, was found to be principally composed of uric acid. On enquiry, he said he had once been very subject to gravel, but that of late he had seen nothing of the kind.

February 18. He was directed to continue his present plan, and to take ten drops of the muriatic acid in some water twice a day, in the intervals of drinking the soda water.

February 25. He was in every respect much better. The proportion of the sediment in the urine was now diminished, and the appearance of it was that of a transparent weak gelatin, rather than an opake mucous deposit. There was no longer any appearance of red gravel in the urine, but a single fragment of calculous matter was occasionally detected in escaping from the orifice of the urethra. One of these was dried, and from the light grey colour, and loose cohesion, was evidently composed of the phosphates. The muriatic acid was therefore laid aside, but the soda water was continued.

February 27. Within the last two days he had passed no gravel at all and was so much better

that he was able to sleep at night for two hours together. In other respects he was now as well as he had been previous to the escape of the bougie into the bladder.

February 28. As the parts were now restored to a comparatively quiet state, and the necessity for frequently passing the water was merely the consequence of the habitually contracted state of the bladder, and not of any excessive irritability, the state of the case seemed to afford a fair opportunity for trying the effect of gradual distention of the cavity, with a view to enable him by this means to retain his water for a longer period. For this purpose an elastic gum catheter was introduced, and about two ounces of warm water were injected. It immediately produced considerable uneasiness and pain in the small of the back, the volume of the fluid was more than the cavity was accustomed to retain, it excited occasional sharp spasmodic pains in the viscus, and I thought it prudent to allow it to run off when it had remained five minutes.

The immediate pain produced by this experiment soon subsided, but by the next day the irritability of the parts was so considerably increased, as to have brought back most of the symptoms nearly to their former extent. So that, although Le Dran has recommended the operation, which has since been tried and spoken well of by one of our own surgeons*,

* Mr. Jesse Foote.

I shall recollect how deceitful appearances sometimes prove, and shall be very slow in proposing the experiment in future, considering that the state of bladder in question can in scarcely any instance, perhaps, be divested entirely of a disposition to excessive irritability, seeing that from this cause the change in its structure was originally produced.

Towards the middle of March, he again improved, still continuing the soda water, and on the 21st of the following month I received a visit from him, when he acquainted me that he was scarcely ever disturbed more that once during the night, that he passed his water very freely, with little uneasiness, and no gravel; that the urine had for many weeks past come away entirely through the urethra, and that consequently as the fistulous openings in the perinæum were completely healed, he was no longer subjected to the distressing inconvenience of his linen being always wet and offensive. Upon this favourable report I recommended him to lay aside his soda water, and return to his usual habits of life, as before his illness.

Case 26.

Stricture in the Urethra and Irritable Bladder, produced by injecting for Gonorrhœa.

W. H. a groom, aged 32 years, contracted a gonorrhœa in 1806. He applied to a medical

person near him, who ordered him an astringent injection, and the pil. hydrarg:

He threw up the injection as directed, and immediately felt great uneasiness about the neck of the bladder, with increased frequency of desire to pass his water. In a few hours he repeated the injection, and the consequent irritation soon increased to that degree as to prevent his remaining in bed five minutes the whole of the following night. The straining to pass his water was incessant, and the irritation of the urethra was so great that the whole canal felt as if violently contracted, so that he could scarce get rid of any water at all, and what did appear was tinged with blood.

The next day the apothecary told him that what he had felt was not of the least consequence, and that as it merely arose from the injection being too strong he was to dilute it with a little water, and go on. He therefore continued to use the injection, and in the course of two months the inflammatory symptoms had subsided, so that he had no longer pain in making water, although the frequency of passing it as well as the discharge, were troublesome as ever. The pills he took for near three months, and the only sensible effect they produced was a slight affection of the mouth.

Subsequent to his laying aside his remedies, the discharge from the urethra continued for more than eight months, when he first observed that the

stream of urine was becoming smaller than usual. On this account he again applied to a person who passed a bougie for him once. The operation somewhat relieved him, and he afterward went on for some months without paying any further attention to it. Finding however, the contraction increasing, he again had a bougie passed several times, by which he was for a time much relieved.

With the occasional assistance of bougies he went on pretty well till October 1814, at which time he was passing a bougie every day. The parts however were more irritable than usual, and a swelling made its appearance in the perinæum. As the increase of this swelling was extremely slow and the pain trifling, he supposed it of no importance, and consequently did not at first mention it. In the course of two months however, it became extremely hot and painful, he now spoke of it to his medical attendant, who immediately desisted from using the bougie, ordering him to rub in two drachms of mercurial ointment every night upon the swelled part of the perinæum.

This treatment he continued for a month, when his mouth became very sore, and he was considerably salivated. Just at this time also, a retention of urine suddenly came on. At this his attendant expressed his surprise, ordered him into a warm bath repeatedly, applied leeches and fomentations to the perinæum, and directed an opiate clyster to be thrown up.

The following evening a small sized elastic gum catheter was introduced, and succeeded in drawing off the urine.

Warm poultices were now applied regularly to the perinæum, and the quantity of mercurial ointment, instead of being rubbed in as before, was laid upon the poultice, in order that the parts might absorb it or not as they chose. In the course of a fortnight the external swelling began to decrease, from which circumstance and from the appearance of the urine, it was concluded the abscess had broke into the urethra. From this time he continued to mend. The poultice was continued for about a month, and then a mercurial plaster was applied in its stead.

The affection of his mouth continued for about two months. He was then well enough to leave his home, and soon returned to his work; his power of passing his water being much improved, but not quite relieved, and there being yet some remains of the swelling in the perinæum.

He remained tolerably well till March 1815, when finding the swelling was again increasing he determined to come to London for advice. He did so, and was received into the St. George's Infirmary.

The inflammation was not very acute, but there was sufficient to create him increased difficulty in getting rid of his water, with much pain. Poultices and fomentations, persevered in for eight weeks did not bring it materially forward, they

were therefore laid aside, and leeches repeatedly applied with cold lotions, under which plan he became easier.

Several unsuccessful attempts were now made to introduce bougies and catheters, but on June the 6th, I with great difficulty got a very small silver catheter nearly through the obstructions into the bladder but yet the water did not flow, and consequently the instrument could not have actually reached the cavity of the bladder. This circumstance added to what I had before observed in former examinations confirmed the opinion repeatedly expressed to him, that some false passage existed, by which the point of the instrument was caught, and prevented from passing the right way. Fortunately however, the object of the operation was by no means essential to his safety, as he was perfectly able at all times to get rid of his water, although not without considerable difficulty.

He soon after this left the House and went to St. George's Hospital. The surgeon who subsequently attended him acquainted me that he believed there were false passages; that in the course of three months he had made no material progress; that now and then an instrument had been got into the bladder, but that the attempts were most frequently unsuccessful; that the abscesses in the perinæum had suppurated, and had left fistulous openings, through which the urine escaped.

Case 27.

Stricture in the Urethra, and Irritable Bladder.

James Kellet, a labouring man, had for fifteen years previous to his death, been troubled with stricture in the urethra, brought on in the first instance by virulent gonorrhæa. From that period the medical gentleman who attended had been occasionally called in to relieve him from retention of urine; which for the most part was readily accomplished by the introduction of a small sized common bougie; latterly however, the stricture had become so contracted as barely to admit the smallest catgut bougie that could be procured.

On these occasions, the instrument was usually suffered to remain some little time, and upon withdrawing it the urine generally followed. These attacks were commonly preceded by inebriety.

For some time previous to his death, he complained of considerable pain in passing his urine, as well as difficulty in getting rid of it; the attempt was frequently followed by the appearance of a few drops of blood, and a purulent discharge. The desire to make water proved a constant source of distress, and it came away in very small quantities, almost guttatim.

When visited in his last attack every endeavour was made to relieve him by the means formerly

made use of, but the introduction of the bougie not succeeding, he was put into the warm bath, in which he voided urine in small quantity but with great pain, to relieve which opiates were administered.

The following day the urethra gave way, a quantity of urine escaped into the cellular membrane, the perinæum sloughed, and the urine escaped by the opening; a very few days after this he expired.

Examination.

On examining the body, the bladder was considerably thickened, but not much contracted, for it still contained near a pint of urine. When the parts were removed and laid open, the internal surface of the bladder was found very much diseased. The inner membrane had apparently suffered repeated attacks of violent inflammation. On some parts the natural surface of the membrane was still visible, but rendered of a bright red colour from inflammation; on other parts effused coagulable lymph had become covered with a reddish brown crust of adherent calculous matter; this change had taken place to a considerable extent about the fundus of the bladder, and also in the commencement of the urethra, at the neck of the bladder.

The prostatal and membranous parts of the urethra were much enlarged from the pressure of the urine, as far forward as the stricture, which was situated at the bulb of the urethra.

The stricture itself was very nearly impervious, and was of a compact texture, although of no considerable extent.

Where the canal of the urethra had suffered inflammation and distention behind the strictures, coagulable lymph had been effused, and the particles of uric gravel had become adherent through the whole extent of the effused lymph.

The fistulous orifice where the urethra had burst, was situated immediately behind the strictured part of the canal.

The prostate gland was considerably enlarged, and had an extensive abscess formed within its substance. *

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* See appearance of the Bladder, PLATE 3. *Fig.* 5.

THE END.

PLATE I.

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EXPLANATION OF THE PLATES.

PLATE I.

Fig. 1.

AN unusually large calculus, weighing four drachms and fifty-six grains, removed from the kidney of a nobleman after death. There were four more calculi of a smaller size in the left kidney, and eleven in the left. This calculus has been divided through the middle, in order to exhibit the internal appearance and arrangement of its laminæ.

a. a. a. Parts of the external surface of the calculus.

b. b. The cut surface, shewing the composition of the stone to be principally uric acid, although in some parts apparently combined with a certain proportion of the phosphates. From the appearance of the section it is pretty evident that this calculus was originally several distinct parts, which subsequently became united together into one larger mass.

c. c. Parts of the external surface rendered particularly smooth and somewhat depressed by the occasional friction with the smaller calculi, that were found lying in contact with it in the kidney.

d. A part of the external surface, that was thinly covered with a deposition of the phosphates.

Fig. 2.

The kidney of a child laid open; shewing the effect of distention from accumulation of urine, in consequence of a calculus formed in the kidney having become impacted in the orifice of the ureter.

a. a. a. a. The natural cavities or infundibula of the kidney very much enlarged from the continued pressure of the secreted urine, all the cavities communicating internally with the central part, or pelvis of the kidney.

b. b. b. The secreting structure of the kidney, rendered so thin by the pressure as to be in some parts almost entirely destroyed.

c. The calculus, as it was found closely wedged into the orifice of the ureter.

Fig. 3.

The urinary bladder of a child laid open on its posterior part, to shew a calculus that was found within its cavity, and also to exhibit the appearance of the internal membrane when labouring under the irritation of stone. *

a. a. The thickened parietes of the bladder.

b. b. The ureters considerably enlarged, and purulent upon their internal surface.

c. The neck of the bladder, and internal orifice of the urethra.

d. The calculus.

* See CASE 6.

c. The surface of the mucous membrane lining the cavity of the bladder, exhibiting the appearance of numerous small spots of extravasated blood, produced by the friction of the stone producing abrasion of the capillary arteries distributed upon the membrane. This appearance demonstrates the principle upon which the urine is in these cases so frequently tinged with blood, shewing that it arises merely from the mechanical injury to the membrane lining the bladder.

Fig. 4.

Exhibits the section of the calculus seen in the last figure.

a. The nucleus of the stone, consisting of uric acid.

b. A thin stratum which from its open and loose texture, and light grey colour is evidently composed of mucous matter and the phosphates only. From the size of the concrete round which this first deposit of the phosphates has taken place, it appears very probable that upon the passage of the uric nucleus from the kidney into the bladder, the secretion of an excess of uric acid had for a time been suspended, a change to be perhaps explained by the escape of the calculus having allowed the irritation within the kidney to subside to a certain degree, although the nature of the subsequent addition proves that this action was very soon re-assumed.

s. The more external parts of the stone composed of the phosphates with variable proportions of mucous matter.

PLATE II.

Fig. 1.

A very large abscess formed within the kidney, the cavity being laid open on its anterior part. *

a. The inner margin of the kidney, or that situated towards the spine.

b. The upper extremity of the ureter, into the divided end of which a bristle has been inserted.

c. The inferior surface of a part of the liver, which from the inflammation of the kidney, had been united by adhesion to its superior extremity.

d. The gall bladder.

e. The general cavity of the abscess, the immediate parietes of which were covered with flocculent coagulated matter, together with the purulent contents of the cavity.

f. A portion of a bougie, introduced from the opening originally made at the posterior part of the kidney, by which the contents of the abscess were evacuated.

Fig. 2.

Shews the appearance produced in the bladder by extreme irritation, from sympathy with schirrhous disease in a neighbouring part. †

a.a.a.a. The thickened parietes of the contracted bladder, laid open by a transverse section through its fundus.

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* See CASE 8. † See CASE 11.

PLATE II.

Fig. 1.

Fig. 3.

Fig. 2.

J. Bewship del.

J.T. Wedgwood

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b. The corpora cavernosa, and corpus spongiosum, of the penis.

c. The mucous membrane lining the cavity of the bladder, crowded with innumerable vessels, and excessively loaded with blood.

d. The neck of the bladder and orifice of the urethra.

Fig. 3.

Exhibits a very singular and curious instance of a preternatural fold of the inner membrane of the urinary bladder, extending from the orifice of each ureter to the opening into the urethra in the prostate gland, forming a valve on each attempt to void the urine, which at first impeded its free exit, and at length proved fatal, with symptoms not unlike to those that attend in cases of bad stricture.

a. The posterior part of the cavity of the bladder.

b. The orifice of the urethra.

c. The opening of the right ureter.

d. The opening of the left ureter.

e. The preternatural fold.

PLATE III.

Fig. 1.

An adherent mulberry calculus, weighing five drachms and four grains, that was extracted from the urinary bladder by the operation of lithotomy.*

a. That part of the surface of the stone that was found adhering to the coats of the bladder, the boundaries of which adhesion are very well marked upon the calculus itself, by that part having been rendered much darker in colour than the rest of the surface.

Fig. 2.

Exhibits a section of the calculus shewn in the first figure.

a. The nucleus, or central part of the stone.

b.b.b. The parts immediately surrounding the nucleus, demonstrating that particular stage of its growth at which the mulberry calculus begins to assume the peculiar appearance which constitutes its most striking external character.

Fig. 3.

A section of a very singularly large calculus composed of the phosphates, and voided by the natural efforts, from the urethra of a female.†

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* See CASE 12. † See CASE 13.

PLATE III.

J. Howship del.

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a. The nucleus of the stone, the texture of which was extremely loose and friable.

b. The subsequently deposited laminæ, very uniform, and similar in structure throughout.

c. c. A very large mass of calculous matter deposited upon one side of the original concretion.

d. d. Numerous open spaces that were found in the more solid texture of the calculus.

Fig. 4.

Represents the neck of the bladder and prostatal portion of the urethra laid open on the anterior part, from a gentleman who by the unskilful introduction of bougies had produced two false passages. *

a. The bulbous part of the urethra.

b. b. The lateral lobes of the prostate gland divided, to shew the course of the urethra.

c. A part of a bougie inserted into a false passage, the direction of which is seen upon the figure to be obliquely backwards, into the substance of the gland.

d. Another portion of a bougie passed through a second false passage that had been produced at the neck of the bladder by the bougie first pressing up the inner membrane into a transverse fold, and subsequently passing through it, making its way out again at some distance beyond.

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* See Page 157.

Fig. 5.

Shews the appearance produced by extreme irritation at the neck of the bladder, with effusion of coagulable lymph, and the adhesion of calculous matter to the newly formed surface.*

a. The neck of the bladder and prostatal part of the urethra, covered with a layer of coagulable lymph, and crusted over with particles of uric gravel that have become adherent to its surface.

b.b.b. Masses of effused lymph, and calculous matter, similar to the above.

c. The remaining part of the natural surface of the membrane lining the cavity of the bladder, of the brightest red colour, from high inflammation.

d. An opening into an abscess connected with the urethra, and formed within the substance of the prostate gland, the cavity of which abscess was covered with adherent calculous matter.

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* See CASE 27.

J. Howship del.

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PLATE IV.

Exhibits a striking example of complicated and extensive disease of the urethra, bladder, and prostate gland, not excepting even the rectum; the whole derived in the first instance from the throwing up of an injection, to cure a gonorrhæa.*

a. The orifice of the urethra, and the glans penis, upon the surface of which may be observed the depressions left by the chancres.

b. The commencement of the stricture that was the immediate consequence of inflammation of the urethra.

c. The termination of this contracted part, the extent of which is about two inches and a half.

d. A very fine silver probe that was with difficulty passed through a firm and closely contracted stricture at the bulb of the urethra, and making its appearance behind the stricture through the divided parts at,

e. Where the canal might have been brought more into view but for this objection, that the whole of the disease could not in any way be distinctly seen at once, and consequently the other appearances preserved upon the figure would have been partially sacrificed by any further prosecution of the dissection.

f. The urinary bladder; its parietes excessively thickened from habitual labour, and its cavity rendered smaller in the same proportion.

---

* See Case 18.

g. The orifice of one of the fistulous canals, many of which were found passing from the urethra in various directions.

h. The double opening from two fistulous passages running into the body of the left corpus cavernosum penis.

i. i. The cavity of an extensive abscess formed in consequence of irritation and disease in the prostate gland.

k. k. Small rounded calculi with highly polished surfaces, many of which were in this case found deposited in little recesses or cells, around the cavity of the large abscess in the prostate gland.

l. A small abscess that was accidentally divided into at the fundus of the bladder, between the external laminæ of its muscular coat.

m. A part of the anterior surface of the intestine rectum, closely adherent to the diseased prostate gland.

n. A common probe introduced by an ulcerated opening in the coats of the intestine, through the abscess in the prostate gland, thence passing out from the divided part of the urethra at,

o. Where the point of the probe makes its appearance immediately behind the stricture.

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